Pit and Quarry

With which is consolidated CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Read in Largest Number of Plants

Vol. XXII June 17, 1931 No. 6

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COMPLETE SERVICE PUBLISHING CO.
538 South Clark St.
Chicago, Ill.

H. W. Baumgartner, *President*
V. E. Larsen, *Vice-President*
S. A. Phillips, *Directing Editor*
W. E. Trauffer, *Asst. Editor*
Harry F. Utley, *Asst. Editor*
Mat F. Beisber, *Asst. Editor*

Editorial Field Representatives:
A. C. Petersen
S. D. Smith

Advertising Representatives:
Chicago
W. A. Buschman L. C. Thaon
Telephone *Harrison 9357*
Chicago, Ill.

New York
E. M. Buck, 68-43 Clyde St.
Telephone *Boulevard 8-5259*
Forest Hills, L. I., N. Y.

Cleveland
W. E. Coates, 1258 Marlowe Ave.
Telephone *Lakewood 1166J*
Lakewood, Ohio

Subscription price: $5 for 3 years, $2 for 1 year in the United States and possessions, North, Central, and South America; elsewhere $1 additional for each year. Single copies 20 cents.

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Vol. XXII CHICAGO, JUNE 17, 1931 No. 6

Cement Safety Trophy Awarded Ohio Plant

NO ACCIDENTS IN 18 MONTHS

The cast stone trophy awarded by the Portland Cement Association to the Wellston Iron Furnace Co. for a perfect no-accident record during the year 1930 was dedicated with appropriate ceremony on the afternoon of May 27. The trophy was erected in a small park which was built especially for the purpose on the plant grounds at Superior, O. Before the top section of the trophy was sealed in place a large glass container in which had been placed a copy of the Accident Prevention Magazine, local newspapers and photographs of the safety committee, was placed in one of the core holes.

About five hundred people of the Superior and Ironton districts were present, and gathered in the park to witness the ceremonies. The program opened with several excellent selections by the American Legion band of Ironton. After a prayer by the local minister, John A. Blank, general superintendent, acted as chairman and introduced the Honorable Thomas A. Jenkins of the 10th Congressional District, who addressed the audience on the value of safety and safe working methods in the various industries.

Judge Daniel C. Jones was next on the program, and made a very fine congratulatory address to the employes present on their wonderful safety record. Floyd Sheward, general sales manager, made a few remarks, and he was followed by Dr. George C. Hunter, former Ohio state representative. Dr. Hunter has been active in safety work for many years, and made a very strong appeal to the employes to continue their good record.

U. Diefenderfer making the trophy acceptance speech for the cement company.

Stanley Owens making the presentation address for the association.

Stanley Owens, representing the Portland Cement Association, Chicago, then gave the dedication address, and formally presented the trophy, which was accepted for the Wellston Iron Furnace Co. by Superintendent V. Diefenderfer, who responded on behalf of his employees. After the band had played the national anthem the meeting was adjourned for refreshments, which were distributed to all who were present by the company officials. In the evening a dinner was held for about fifty company and state and county officials and visiting cement company representatives.

Close Michigan Cement Plant; Prices Too Low

Because it costs the state of Michigan $1.44 to produce a barrel of cement at its convict-operated plant at Chelsea, while private cement companies are offering it at 60 cents in some instances, the state has ordered the plant closed indefinitely. More than 200 prisoners who have been housed at the plant will remain there under guard because of overcrowded conditions at the state penitentiary at Jackson.

Huge Dam to Require Volume of Aggregate

TEXAS PROJECT CONTRACT LET

A contract has been let to the Fegles Construction Co., Minneapolis, Minn., for the construction of an enormous dam and a hydro-electric power plant on the Colorado River in Texas. This project is sponsored by the investment firm of Emery, Peck & Rockwood Co., Chicago, Ill., and will be known as the Hamilton dam.

This dam and its generating plant will be located in the counties of Burnet and Llano between which the river flows. Its length will be approximately 9,000 ft., with a maximum height of 137 ft. The major portion will be constructed of concrete, with separate sections of rock and earth-fill. The area to be submerged is approximately 25,000 acres including a settlement, ranches, and a cemetery.

Estimates place the required construction period as about two and one-half years. The generating capacity will ultimately be 30,000 kw., but the present contract calls for the first two units only, these to have a combined capacity of 20,000 kw. The cost will be approximately $6,500,000, according to officials of Emery, Peck & Rockwood Co. As work will be started immediately, the completed plant is expected to be ready for operation early in 1933.

The lower portion of the project—the plant site—is along the state highway between Austin and Llano, about 45 miles northwest of Austin in an air-line. Below this site, the gradient of the river channel is such that additional dams and power plants could be erected to re-use the flow of the Colorado River if ever warranted for future requirements.

A feature of the Hamilton dam is that the concrete portion, instead of being the usual thick, solid mass, will be built as a heavy, steel-reinforced wall on the upstream side with substantial concrete buttresses spaced at 70-ft. intervals on the down-stream side.

E. R. Ballinger Retires from Products Business

The Shelton Concrete Products Co. has purchased the concrete products business of E. R. Ballinger, in Seattle, Wash.

Weathering Symposium at A. S. T. M. Meeting

McMILLAN, HANSON TO TALK

A symposium on "The Weathering Characteristics of Masonry Materials" will be one of the features of the thirty-fourth annual meeting of the American Society for Testing Materials, to be held in The Stevens, Chicago, June 22-26. This symposium will take up the entire tenth session, Thursday morning, June 25. Its purpose is to bring out available information on the weathering of masonry materials and to emphasize those phases which require further study and on which information is incomplete. This question is of great importance in most structures.

Papers to be given in this Symposium follow:

1. "Economic Aspects of Masonry Decay from Weathering Effects," H. S. Brightly, sec.-director, Building Stone Assn. of Indiana, Inc.
2. "Weathering of Concrete," E. Viens, director, testing laboratories, Dept. of Public Works, Ottawa, Canada.
3. "The Weathering of Structural Clay Products," J. W. McBurney, research associate, Common Brick Manufacturer's Assn.
4. "Weathering of Stone and Slate," G. F. Loughlin, U. S. Geological Survey, and C. H. Behre, Dept. of Geology, University of Cincinnati.
5. "Weathering of Aggregates," L. O. Hanson, University of Wisconsin.
6. "Weathering Test Procedures for Various Masonry Materials," F. H. Jackson, senior engineer of tests, U. S. Bureau of Roads; H. D. Foster, research engineer, Ohio State University; D. W. Kessler, civil engineer, Bureau of Standards.
7. "Bibliography and Abstracts on Weathering of Masonry," F. O. Anderegg, consulting engineer; F. R. McMillan, research director, Portland Cement Assn.; D. E. Parsons and D. W. Kessler, both of the Bureau of Standards.

The symposium has been arranged by a special coördinating committee on Weathering Characteristics consisting of representatives of several of the A. S. T. M. standing committees which are interested in this field.

On Thursday evening, a joint session of the society and the Western Society of Engineers will hear a discussion on "The Economic Significance of Specifications for Materials." John Brunner, Illinois Steel Co.; P. Park, Pullman Co.; J. P. H. Perry, Turner Construction Co.; A. R. Lord, consulting engineer, and J. W. Bancker, Western Electric Co., will discuss the subject from the various angles of producers, consumers, and purchasing agents. These addresses will introduce the subject and the meeting will be then opened for general discussion from the floor.

The committee planning this joint session is composed of Zay Jeffries, consulting metallurgist, Aluminum Company of America; E. S. Nethercut, director, Western Society of Engineers; G. E. Warren, asst. gen. mgr., Portland Cement Assn., and C. L. Warwick, sec.-treas. American Society for Testing Materials.

Sand-and-Gravel Plant Under Way at Alma, Wis.

Construction is well under way at the new plant of the Western Wisconsin Sand & Gravel Co., south of Alma, Wis., near the bank of the Mississippi River.

The company, recently incorporated by Alfred Rasmussen of La Crosse, Wis., and E. G. Bingham, Winona, Minn., has established offices at La Crosse.

Erection of the new sand and gravel plant and stripping of overburden on the deposit, which is to be excavated dry, are under the supervision of Earl Zenker. The company owns a tract of 175 acres which was purchased only recently.

To Reopen Iowa Gravel Pit Idle Over 20 Years

The S. S. Rundall gravel pit in Moville, Ia., which has not been operated for over twenty years, is to be reopened again, after a recent series of tests of the deposits by R. E. Betz, of Sioux City.

New Stone Company Has $200,000 Capitalization

The Campbell Stone Co., handling stone, lime, sand, etc., in Afton, Mich., has incorporated its business under the same name, with a capital of $200,000, all of which has been subscribed and paid in.

Dredging in Upper Pool of Muskingum Progresses

The Muskingum River Gravel Co. of Zanesville, O., has started dredging in the upper pool of the Muskingum River near Ellis, O., for the first time in two years.

One big paving job is now being filled by the company and new business is expected soon in the graveling of township roads. One dredge has been stationed at Ellis to take gravel from the river bed while other equipment of the concern is still being operated in the lower pool of the river.

Jacobs Stone Corporation Buys Limestone Deposit

The Jacobs Stone Corp. of York, Pa., has acquired a 168-acre limestone tract near York City. According to William P. Jacobs, secretary, the stone analyzes from 96.50 to 99.57 pure calcium. No definite plans toward development of the deposit have been announced.

New Ready-Mix Plant Under Way at Dallas

BATCHING UNIT IN OPERATION

The Dallas Transportation Co. is completing the erection of a large ready-mixed-concrete at Dallas, Tex., which is scheduled to go into operation some time this summer, according to F. S. Oldt, an official of the concern. The company is, however, operating a concrete plant in East Dallas at present.

The East Dallas plant, which is wholly a batching plant, the mixing being done in the trucks enroute to the job, has a capacity of 50 cu. yd. of plastic concrete per hour. It is comprised of two 35-cu. yd. bins, a set of Heltzel scales and batchers, and one 54-ft. portable Barber-Greene belt conveyor for handling sacked cement to the storage and operating floors. The bin is charged by a Universal truck crane, which is elevated 10 ft. above the tracks. The crane has a 35-ft. boom and a ½-cu. yd. Owens clamshell bucket. Railroad trackage is directly beside the plant with storage for 15 cars of material. Cars are switched by using the "nigger-head" on the crane. A fleet of seven Jaeger 3-cu. yd. truck mixers, mounted on Type B Liberty trucks with pneumatic tires, is used to transport the concrete.

The personnel of the East Dallas plant comprises a foreman, a scale man, two cement men, crane operator and a clean-up man in the car. All water is measured by regulating tanks on the truck mixers. Each truck is charged, on an average, in two minutes. To date the plant has turned out nearly 15,000 cu. yd. of concrete, strength design only, and 75 per cent. of this production has been used for paving in the city and county of Dallas.

Chas. A. Vilbig is general manager of the Dallas Transportation Co.; F. S. Oldt, supervising engineer; and A. Y. Garrett, plant superintendent. Concrete design is supervised by Gene Knox of Dallas, technician. Equipment for this installation was handled through the Browning-Ferris Machinery Co. of Dallas.

Pennsylvania Producer Moves to New Location

The Hunlock Creek Sand & Gravel Co. of Hunlock Creek, Pa., near Wilkes-Barre, is moving and rebuilding its plant on a location about three miles distant from the former operations. The move was made because of the depletion of the original deposit.

The new plant will have a capacity of 1,000 tons per 8-hour day. Work of rebuilding the operation is being performed under the supervision of C. Rees, the owner, and A. T. Harris, superintendent.

Cement Film Depicts Concrete's Many Uses

IS AVAILABLE FOR EXHIBITION

The making of Portland cement and the many uses of Portland-cement concrete are visualized in two new one-reel educational motion pictures prepared by the United States Bureau of Mines in coöperation with the Universal Atlas Cement Co., a subsidiary of the United States Steel Corp. Animated drawings and ingenious photographic methods make it possible to show clearly the highly-complicated processes employed in the manufacture of Portland cement, and also to illustrate the importance of durable construction secured through the use of this widely-used construction material.

"From Mountain to Cement Sack," the story of the manufacture of Portland cement reveals the many costly and complicated processes employed in making cement. The film shows the raw materials used to make Portland cement and explains that it was so named because the first concrete made from it resembled a building material found on the Isle of Portland.

After this brief bit of history the film shows a modern cement plant and pictures the preliminary steps in the manufacture of cement. Quarry operations, including drilling and the firing of blasts, are shown. Then the audience is taken to the cement mill, where the work of crushing limestone and the removal of moisture in enormous rotary driers is pictured. Animated drawings illustrate how the various machines operate.

The film explains that either clay, slag, or shale is used in addition to limestone. Clay and shale are handled as is limestone. The slag comes from the steel mills and a view of the white-hot slag flowing from the furnace is given.

The picture draws an interesting and an easily-understandable analogy between cement making and bread baking. Materials for cement making must be properly proportioned, just as bread ingredients are measured, it is pointed out. The burning of cement materials in large revolving kilns is next shown and this is compared to the baking of bread. While bread is baked ½ hr., cement is burned 6 times ½ hr. A novel photographic effect is a glimpse of the interior of one of these kilns, where the cement is being burned at a temperature of 3,000 deg. F., nearly ten times that employed in bread baking. This burning changes the raw cement materials into a new material—clinker. A series of scenes shows the grinding of this clinker and the addition of gypsum, which regulates the setting time of cement. The material is then pulverized until it is fine enough to go through a sieve that will hold water. The working of an ingenious rotating "finger" which picks up a sample of cement every 8 sec. for testing is next shown, and a title explains that this testing is continued day and night.

In the making of cement, there are eighty costly operations, which involve the powdering, burning, and sacking of mountains of limestone.

Lorado Taft, world famous sculptor, who pioneered in the use of concrete in his field; America's oldest concrete street; the Panama Canal; and views of the world's highest building are features of the picture "Construction That Endures," companion reel to "From Mountain to Cement Sack." Each reel is complete in itself and can be shown alone or the two can be combined to make a half-hour showing. The same central character is utilized in both films. Animated drawings are used throughout "Construction That Endures" to show the composition of concrete and some of its advantages for durable construction.

The audience is given a good idea of the part that concrete plays in modern sports by views of a concrete stadium, concrete tennis courts, and a concrete swimming pool. The film next takes up the use of concrete to make durable roads, streets, bridges and grade separations. Among some of the scenes shown are America's oldest concrete street built in Bellefontaine, O., in 1892. Views of a modern airport, with runways, markers and hangars constructed of concrete, are given. Concrete plays its part on the farm as is shown by scenes of silos, driveways and pipe for irrigation purposes. The many uses of concrete for railroads also are demonstrated. Concluding scenes of the film show the use of concrete by artists and architects in the making of statues, buildings, and beautiful color effects in stucco and terrazzo. Lorado Taft, the famous sculptor, was caught by the camera in front of a model of his statue, the "Blackhawk Monument."

Copies of either "From Mountain to Cement Sack" or "Construction That Endures" may be obtained for exhibition purposes by schools, clubs, churches, civic and business clubs, and others interested, by applying to the Pittsburgh Experiment Station, United States Bureau of Mines, Pittsburgh, Pa. No charge is made for the use of the film, but the exhibitor is asked to pay transportation charges.

Inland Lime & Stone Co. Erects Office Building

Contract for the erection of a new office building at Port Inland, Mich., has been awarded by the Inland Lime & Stone Co. to Harry Eriksen, Manistique, Mich., contractor.

The new building will be 38 ft. by 40 ft.; two stories high with a full basement. The site is just north of the main crushing building and located on the main highway through the company's property. The structure will be of steel and concrete and cinder blocks with a composition roof.

Accident Rate Lower in Quarries in 1930

SHOWS 13-PER CENT. DECREASE

A reduction of thirteen per cent. in the accident rate for the stone-quarrying industry in 1930 has just been announced by Scott Turner, director of the U. S. Bureau of Mines. Mr. Turner's statement is based upon reports which the Bureau of Mines has received from quarry operators that employ nearly three-fourths of the total number of men employed at all quarries in the United States. The reports cover the quarrying and crushing of stone and the manufacture of lime and cement, as well as dressing done at dimension-stone quarries.

A special tabulation of returns from operating companies received by the Bureau up to April 18, shows that accidents in 1930 occurred at a rate of 106 for each thousand men employed. Reports from the same plants for the previous year showed 122 accidents per thousand men employed. The fatality rate during 1930 at these plants was 1.51 and the injury rate was 105 per thousand men employed. Corresponding reports for the same plants in the preceding year showed a fatality rate of 1.63 and an injury rate of 121. These figures cover all injuries that disabled an employee for more than the remainder of the day on which the accident occurred.

Comparative figures for 1929 and 1930 for identical plants show that in 1930 there was a reduction of a little over three per cent in the number of men employed and a reduction of more than nine per cent in the total number of manshifts worked. The average working time per employee at these plants was 256 days in 1930 as compared with 274 days in 1929.

Complete figures covering the entire quarry industry in the United States will be issued by the Bureau of Mines as soon as the Bureau has received reports from the small number of companies that have not as yet sent in their returns for 1930. The final figures to be published will give more detailed information regarding accidents that occurred at the quarries.

Honolulu Firm Awarded Concrete-Plant Contract

According to advices from Washington, D. C., Walker & Olind of Honolulu have been awarded a contract to construct a concrete-mixing plant for the navy department at Pearl Harbor. The cost is $22,500.

Wisconsin Gravel Plant Starts Season's Schedule

The Casco Gravel Co. has resumed operations at its Casco Junction plant near Luxemburg, Wis. Prospects for the company appear excellent this year, a number of large contracts for sand and gravel having been signed.

No-Accident Campaign Among Cement Plants

SIXTH ANNUAL JUNE CONTEST

The annual June no-accident campaign conducted by the Portland Cement Assn. is again in progress. More than one hundred plants are participating in the drive, representing nearly 30,000 workers, all striving to go through the entire month without a mishap involving loss of time.

Charles Schmutz.

Charles Schmutz, vice-president of the Bessemer Cement Corp., Youngstown, O., was the first executive to enroll his plant in the contest.

For the past five years, a June campaign has been conducted by the association. Each of the five June drives produced a new low record. In the 1925 campaign, there was a total of 92 lost-time accidents, including fatalities. In 1930, there were 37 lost-time accidents and no employee fatalities, a reduction of over 59 per cent. in six years.

New York Gravel Plant Under New Management

The New Windsor Building Supplies Co., Inc., has been formed at Newburgh, N. Y., to take over the Newburgh Building & Supply Corp. Production of sand and gravel at the New Hudson plant will be continued by the new company after the plant is completely rebuilt. Machinery is scheduled to be installed this month.

Officers of the concern are C. E. Townsend, president and treasurer; G. Krom, vice-president; C. H. Mosher, secretary; and E. G. Kalb, assistant treasurer.

Erie Sand & Gravel Co. Lets New Plant Contract

The Erie Sand & Gravel Co., R. W. Potter, president, Erie, Pa., has let a contract for the erection of a sand-washing plant at West Front and Sassafras streets.

Texas Sulphur Tax Up; Defeat Cement Proposal

The Texas state legislature has adopted an amendment increasing the tax on sulphur production to 75 cents from 55 cents.

A similar amendment, which planned to place a tax of 5 cents per 100 lb. on Portland cement produced within the state, was defeated.

Gravel Firm Institutes Suit on Riparian Rights

The Soo Sand & Gravel Co. of Sault Ste. Marie, Mich., has filed suit for $7,000 damages against the M. Sullivan Dredging Co. The gravel firm, in its complaint, alleges that it holds riparian rights to properties on Whitefish Bay and that the dredging company removed large quantities of material from the bed of the bay on property which is under the gravel company's control.

Hartford Talc Co., Inc., Produces White Quartz

The quartz in the quarry of the Hartford Talc Co., Inc., Baltimore, Md., lies in massive formation and is of a nearly pure white color. The vein is about 50 ft. below the surface and, as at present uncovered, shows a width of 30 ft. and a depth of 25 ft.

Owing to the tight formation, it is necessary to blast the rock out with dynamite. It is then hoisted to the yard and hand picked. The refuse is hoisted to the dump at the back of the quarry. The best grade is hauled to the mill for preparation.

In the first operation the quartz is fed to a 12-in. by 18-in. jaw crusher which feeds a bucket-elevator that takes it to the third floor of the mill where it is fed to a revolving screen fitted with ⅛-in., ½-in., 1-in., 1½-in. and 2½-in. sections. Each size is dropped into its own bin.

When preparing bitstone, the ½-in. to 1-in. quratz is fed by gravity from the bins to a set of double rolls on the ground floor. The top rolls are corrugated and the bottom rolls are smooth. After crushing, all the product is fed to a bucket-elevator which carries it to the top floor of the mill where it is fed to a series of vibrating screens set to produce the particular size Bitstone or other quartz being prepared. After it passes through these screens, it is carried by gravity to the first floor where it is packed and weighed, and is now ready for shipment.

The "oversize" returns by gravity to the rolls and goes back to the screens. The "undersize" goes to a separate bin, where it is again screened and prepared for lithographing, filtering, abrasive and other purposes, which require the finer meshes.

The entire system is so arranged that once the material leaves the primary crusher the mill proper can be operated by three men.

Contract Is Awarded for Canadian Gypsum Plant

The Canadian Gypsum Co., Ltd., has awarded a contract to W. H. Cooper, 42 James St. S., Hamilton, Ont., for a new plant at Willow Grove, Ont. The main units will include a mill building, sheet-rock and crushing buildings and a warehouse.

Dewey Building Dock For River Shipments

TO SHIP CEMENT AND STONE

The Dewey Portland Cement Co. is completing, at its Davenport, Ia., plant, the installation of a loading dock for the shipment of sacked cement and crushed stone by barge on the Mississippi River. This dock, which is not intended to be permanent, is being built primarily to facilitate delivery to twin locks No. 15 of the government 9-ft. channel project which is being built 10 miles up the river from the plant.

The fill required for this dock has been in place for some time and was made of overburden stripped from the company's quarry. Permission has been obtained from the government to build eight 12-ft. by 24-ft. rock-filled timber cribs on the edge of the channel. An inclined 30-in. belt conveyor on 170-ft. centers will carry the material from the shore to the loading dock which will be built on these cribs. The conveyor is being inclosed with corrugated metal.

The crushed stone will be loaded at the plant in 12-cu.yd. side-dump cars and the cement into box-cars. These will be hauled to the discharge point on the track which is on a timber trestle at this point. Stone will discharge to a bin of 70-cu.yd. capacity which will discharge through a gate onto the belt conveyor. Cement will be unloaded from the box-car onto a roller-type gravity conveyor which will discharge to the same belt conveyor.

Belt conveyor housing to new dock under construction.

At the dock end of the belt conveyor, stone is discharged through a chute into barges. Cement is fed to the barges by another gravity conveyor similar to the first. The barges to be used for hauling this material are of 175-ton capacity and are owned by the contractor.

The belt conveyor is to be driven by a 40-hp. Fairbanks-Morse electric motor through a Falk speed-reducer and chain. A jaw clutch on the drive shaft will allow two conveyor speeds, 100 ft. per min. for the cement and 350 ft. per min. for the stone. Quaker City conveyor belting and Webster pulleys and idlers are used. The dock was designed by the engineering staff of the plant, under the supervision of H. F. Tyler, vice president.

21,000-Ton Blast at Ohio Silica Quarry

EXCELLENT BREAKAGE SHOWN

The Columbia Silica Co. recently set off a blast at its quarry at Copley, O., which is interesting because of the unusual type of material blasted. The rock quarried is what is known as cement pebble or conglomerate, and consists of white pebbles imbedded in sand, both of which are very high-grade silica. The pebbles vary in size with a maximum of about 1½ in.

The shot consisted of 31 well-drill holes ranging in depth from 32 ft. at the east end of the shot to 49 ft. at the west end. The holes were spaced an average of 16 ft. apart and approximately 20 ft. back from the face. The spacing between holes was very irregular because of vertical seams running at cross angles with the face forming blocks, and holes were placed in relation to these seams and in the block to best advantage, with the idea of securing the greatest possible breakage or fragmentation.

The same is true in regard to vertical seams running parallel with the face, and it was necessary to place holes out in front of the main line of holes so as to locate a charge in the block of rock in front of a seam, with the result that there were twelve holes out in front while the base line row contained nineteen holes, yet it was not what is known as a "two row shot." The back, or base line, row was loaded to carry the burden and a light charge used in the front holes, so distributed as to work through the burden much the same as a pop-shot. The results showed this plan to be sound, as material was exceptionally well broken up.

The holes were loaded with 40 per cent. Burton quarry gelatin in the bottom, where a dense charge was needed to pull the toe, and the balance of the charge loaded with 40 per cent. Burton ammonia dynamite, all in 4-in. by 16-in. shells.

The shot produced approximately twenty-one thousand tons, and seven thousand pounds of explosives were used, giving a production of three tons of rock per pound of explosive. The blast was detonated with Cordeau detonating fuse, of which approximately one thousand nine hundred feet was used. Loading was under direction of W. O. Dunn, technical representative of Burton Explosives, Inc., of Cleveland, O.

Three views of the quarry of the Columbia Silica Co. taken before, during and after a recent blast.

The new plant office of the Columbia Silica Co. at Copley, O.

The plant of the Columbia Silica Co. is one of the most modern in existence. A complete description of the plant and quarry was published in the April 22, 1931, issue of PIT AND QUARRY. At that time a new plant office was under construction, which has since been completed. The accompanying photograph of this office shows it to be unusually attractive.

Blast in Prison Stone Quarry Kills U. S. Guard

An explosion in the Fort Leavenworth stone quarry, at Leavenworth, Kan., on Thursday afternoon, May 21, took the life of Hugh R. Waddle, a federal prison guard. Mr. Waddle was in charge of a group of armed soldiers who guarded seventy-five prison workmen in the quarry. The man who usually takes charge of the blasting was absent and Mr. Waddle, after getting the other men in the clear, touched off a charge of dynamite. It was apparent that an instantaneous fuse had been used since the explosion took place before he could move away.

Cement Credit Men Meet at Convention in Boston

A credit conclave of representatives of the cement and other building-materials industries, numbering about 100 credit executives, will be one of the 22 credit group conferences which will feature the Credit Congress of Industry of the 36th annual convention of the National Assn. of Credit Men at Boston, Mass., June 22-27, it was announced recently.

Building and building-materials lines, under the chairmanship of E. B. Odenkirk, credit manager of the Medusa Portland Cement Co. of Cleveland, along with the other industry groups, will meet Friday and Saturday, June 26 and 27. The Credit Congress of Industry, of which this group is a part, has grown out of the credit group sessions which have been held at each convention since they were successfully introduced in 1924.

Editorials

More Government in Business

UNDER the plea of public interest and economy, politicians are continually reaching out for new fields of political exploitation, and this policy is driving them further and further into what has heretofore been considered the particular sphere of commercial enterprise. In the nonmetallic-mineral industries this manifests itself in the form of increasing attempts on the part of state governments to inject themselves into the production of the raw materials of road building.

Until recently this activity has been confined almost exclusively to the manufacture of cement in state-owned plants and to agitation for the enactment of legislation designed to make cement manufacture a function of state government. Lately, however, the attention of politicians has been directed more often toward the production of aggregates, and if state governments have not actually entered the field as producers they have encouraged others to do so, either by the promise of purchase contracts or by furnishing the necessary working capital. Those who advocate this form of government enterprise apparently do not consider that it represents an encroachment on the legitimate activities of business and that it carries a sinister threat for the security of all business undertakings. If left to our politicians, the socialization of industry would proceed rapidly, indeed.

The nonmetallic-mineral industries seem to be favored by politicians for this sort of government poaching, possibly because the growth of state-controlled road-building activities has made government production of their raw materials seem a logical development. At any rate other industries do not appear to be similarly threatened, evidently because their products are not applied in ways so closely scrutinized and regulated by government authorities. In our industries this tendency to intrude upon the domain of business enterprise holds dangerous possibilities and, in times like these, may easily bring about the ruin of useful established businesses.

The question of the respective rights of government and business enterprise is one which must soon be settled, if business is to have that assurance of freedom from government competition to which capital is entitled. The burdens of competitive business are sufficiently onerous without being aggravated by the threat of competition from government sources, whether this be actively carried on by government or merely financed by government. Governments which live largely through taxing the profits of industry can not expect revenues to increase if the opportunities for profit-taking are to be subjected to greater restrictions.

In those cases where government, hesitating to enter boldly into the field of actual production, accomplishes practically the same thing through subsidizing the erection of new production facilities created for government purposes, one may well wonder why the aid of subsidy, if it must be provided, is not given to existing producers rather than to new entrants into the field. The industry is already sufficiently overcrowded and the profits of production on that account sufficiently meager, without increasing the clutter and decreasing the gains by the erection of fresh competition. Instead of weakening the position of existing facilities, whose taxes have contributed so largely to government support, government should strive for the strengthening of them; instead of making their future more precarious, it should aim to make their future more secure.

Of course there is the possibility that these encroachments of government on the field of legitimate business indicate a trend on the part of our politicians and their *protégés* toward the adoption of state socialism. If this be true, we are faced with the absurd situation of being governed by laws, such as the Sherman and Clayton acts, intended to safeguard the rights of the individual by guaranteeing free competition, while government officials incline toward policies favoring government monopoly and the destruction of individual enterprise. But the dangers of this growing tendency overshadow its absurdity. If it should win even limited acceptance, few business enterprises would be safe, business opportunity would not be sufficiently alluring to attract the capital needed for warranted improvement and expansion, and the damage done to the industrial fabric of the country would be incalculable.

Laissez-faire advocates will contend—not without an element of truth—that the economic superiority of existing production facilities will in time eradicate the inferior plants owned or subsidized by government agencies, but they overlook the fact that government-owned activities are as long-lived as the governments that control them and that a government which can subsidize the beginning of a new enterprise can also subsidize its continued operation in the face of excessive cost. The difficulty with which new government activities are discontinued, once they have been started, ought to be sufficiently evident to taxpayers in all parts of the country, while the ease with which an unprofitable undertaking can be perpetuated is well exemplified by the Michigan state-owned cement plant. Those who hope that these diseases will run their course and that time will effect their cure can not be greatly concerned by the prospect of business ruination by government competition and they display an optimism which the circumstances do not

justify. If they are to live to see a realization of their hopes they must lend their support to more rapid means of correction than the mere passage of time.

Others who believe that a strengthening of specification requirements will eliminate the government-owned roadside plant display a strange form of argument. Is it likely that government agencies which would erect or assist in the erection of government-owned or government-subsidized plants would adopt specifications which would render those plants inoperative? Is it probable, for example, that state highways departments, committed to a policy of financing the construction of roadside plants and, at the same time, empowered to fix material specifications, should so exercise one power as to obstruct the other? Politicians do not knowingly work for the defeat of their own purposes.

The trade organizations of our industries are unusually well suited to oppose, wherever and whenever it appears, this growing trend toward government ownership and government stewardship. Where, as in one state, the highway engineering staff is opposed to government competition, while highway department officials favor it, the true political character of the movement should be exposed. If the public can be made to realize that increasing government activity in the sphere of legitimate business will mean increasing hordes of political parasites preying on the public purse, the support necessary to the continued growth of such activity will not be forthcoming. The industries' associations, acting in conjunction with the trade-press, can, through the means of relentless publicity, defer and possibly prevent the widespread adoption of any policy so full of danger for established business. Their obligation to do so should be evident to all who are interested in protecting the capital already invested in the nonmetallic-mineral industries.

The Six-Hour Day

FOR a long time students of production and observers of workers and their habits have urged the adoption of a shorter working day in the interest of increased efficiency. From close study of the conditions prevailing in hundreds of industrial plants of all kinds they have derived some very definite ideas of the principles that underlie human work, and these point unmistakably to the advantages of shorter working periods. In general they have found that, within certain limits, the output per worker can be increased by shortening the period through which he works, the output curve rising sharply during the initial reductions in the working period and flattening out as the reductions are increased.

The short working day fortunately has not remained a mere theory. It has been applied to varying degrees in many plants in different lines of business and with different classes of workers. That it has justified itself in the majority of cases is ample proof of the validity of the principles on which its adoption has been advocated. Its failures have been due principally to lack of understanding, lack of sympathy, and lack of perseverance. It has succeeded in practically all cases where it has been properly applied.

Those who oppose the adoption of a shorter day generally overlook, or are unaware of, the fact that the working day has been shrinking for many years. It is not so long—reckoned in relation to the period of civilization—since the working day, even for children, was 18 and 20 hours in England, while the 14-hour and 16-hour days are well within the memory of many men now living. Only a few years have elapsed since the abolition of the 12-hour day in our steel mills, a change that, in the opinion of Judge Gary, was impossible of attainment in his industry. Even the 10-hour day, most common of all during the last twenty years (except, possibly, for the steel industry), has largely given way to the 8-hour day, and this is now being shortened to a day of 6 hours.

In spite of these reductions in the length of the working day, production has steadily increased, due entirely, some will say, to the greater use of machinery, but due largely, others will say and prove, to the increased output per man-hour resulting from faster working made possible by greater leisure and rest. The truth of the latter claim has often been demonstrated where no mechanical improvements have been introduced and where every gain in production was traceable solely to increased man productivity.

Where the 6-hour day or shift has replaced the 8-hour day all the gains that were found to accrue from a shortening of the 10-hour day to 8 hours are obtained and, in addition, the elimination of the periods formerly set aside for meals. Thus, a plant working a 24-hour day operates on four 6-hour shifts, free from any interruptions other than those caused by breakdowns, inspections and repairs. In one plant, where the 6-hour shift was inaugurated last year, there has been a gain of nearly 17 per cent. in the average daily output per worker. The base wage, due to the fact that the day rate was not reduced when the day was shortened, was automatically increased 12½ per cent. The workers were found to be not only more efficient, as shown by the increase in their output, but they were more cheerful, they worked more steadily because of the short shift, they lost no time in stopping and starting for meals, they were in better health because of the greater leisure available for amusement and other recuperation, and they displayed a new type of loyalty. The owners of the business not only profited from the greater output per worker, but they benefited from decreased overhead, the opportunities for readjusting the personnel, and an increased return from the capital invested due to the more nearly perfect utilization of production facilities.

In many plants to-day, on account of slackened demand, short working days, some of 5 and some of

(*Continued on page 43*)

Lime Manufacturers Discuss Problems at Thirteenth Annual Convention

Principal Subjects Are Price Warfare, Overproduction and Potential Markets

THE same problems that confront producers in other lines of business engaged the thoughtful attention of American lime manufacturers who gathered for their thirteenth annual convention at White Sulphur Springs, W. Va., June 3 and 4. Price warfare, revision of the anti-trust laws, destructive competition, the prevention of overproduction, and new markets for old products shared the discussions in about the same proportion as they divided the thoughts of those present. The threat of further government interference in business—that specter which hovers over all industry in America—cast a gloomy shadow over speakers and audience alike as the possibility of an extension of government activities forced itself on their notice.

Norman G. Hough, president, National Lime Association.

Several speakers were agreed that the need for, and the advantages to be derived from, concerted action through the industry's national association are greater than at any previous time. With price cutting an almost universal practice, driving prices farther and farther below profit-making levels and encouraging buyers to make greater and greater demands for unreasonable price concessions, the outlook for profit taking is darker than ever before. In the face of surplus production capacity and its inevitable result, surplus production, it is imperative that industry safeguard its future by practicing that self-discipline which seems to be attainable only through trade-organization work. If industry cannot regulate its own affairs, said one speaker, government will step in and do the job for it.

Although subjects of peculiar interest to lime men formed the major part of the program, it was evident early in the proceedings that problems of more widespread interest were qualifying many of the opinions expressed and influencing the attitudes of those present toward the matters in hand. Almost every subject scheduled for consideration touched at some point on those greater problems of price stabilization, unfair trade practices, production control and so on. Like men in other lines of business, lime manufacturers have been made increasingly aware of the fact that the question of whether a given practice is fair or unfair, wise or unwise, is more than a matter for individual conscience to decide. They are coming to realize that price cutting, over-production, dumping and similar practices are general and not individual in their effects and must, therefore, be judged by industrial rather than individual standards of right and justice.

In his annual report, President Hough stressed the importance of distribution to the lime industry; the possibly great opportunities in the new market for lime offered by the lime-chlorine treatment of sewage advocated by the Chlorine Institute; and the necessity for the collection and dissemination of production statistics for the information and guidance of the lime industry.

According to Mr. Hough, the association has given practical expression to the need for restricting production by giving helpful advice to prospective newcomers in the lime industry. In several instances, men considering the manufacture of lime as a new enterprise have consulted the association and, by being shown the overcrowded condition of the lime industry, have been dissuaded from entering it.

He voiced the growing dissatisfaction of business men with the new policy of government as expressed through the Federal Trade Commission. After the commission had accepted and approved the prac-

Burton A. Ford.

S. M. Shallcross.

Lee S. Trainor.

R. E. Tremoureux.

tices submitted to it by the association, as the result of the Trade Practices Conference of two years ago, it decided to change these practices and withdrew its approval of those previously accepted, said Mr. Hough. Business men are beginning to feel, he continued, that the commission should either help business or allow it to help itself.

The demands for revision of the anti-trust laws are growing greater, he said, because conditions are making it increasingly necessary to limit production, fix prices and take other steps in the interest of better business by resorting to methods which, under the restrictions imposed by the Sherman act, are now illegal.

The gathering and publishing of production statistics by the U. S. Bureau of Mines seems assured, said Mr. Hough. Senator Wesley L. Jones, of the Committee on Federal Appropriations, has promised his support for an appropriation of $5,000 to enable the bureau to undertake the work. Although the association has tried to perform this service, it received reports from only 71 manufacturers representing only 43 per cent of the industry's total production.

Mr. Hough cited the formation in February of the Southern Lime Producers' Assn. as evidence of the growing reliance placed by manufacturers on trade associations familiar with local conditions. Prior to the organization of this new body, the southern lime industry was in a turmoil, he said, and already the new association has shown its usefulness.

According to investigations made by the U. S. Bureau of Standards, high-strength masonry mortars are not necessarily the best, said Mr. Hough. The mortar used in the joints, which form 25 per cent of a masonry wall, must be good, as measured by other standards. These, arranged in the order of their importance, are: (1) Plasticity, (2) adhesion, (3) volume change after hardening, (4) elasticity, (5) resistance to frost, (6) freedom from efflorescence, (7) rate of hardening, (8) absorption, and (9) strength. In all but the last of these, said Mr. Hough, lime excels all competitive materials, and these are the properties that determine the desirability and water-tightness of unit masonry. The association will not repeat the error made some years ago, when through lack of alertness and aggressiveness, the plaster business, formerly of great importance to lime makers, was lost to the manufacturers of competitive materials, according to Mr. Hough. It will carry the truth about the properties of lime to architects, engineers, contractors, and scientific societies, so that lime may be used for those purposes to which it is admirably suited. Mr. Hough quoted a prominent New York architect as having said that "mortar with a large percentage of lime—up to 60 per cent and 40 per cent of cement —makes a better mortar." Mortar containing as much as 90 per cent of lime is being used successfully and the Bureau of Standards' work indicates the value of high-lime-content mortar, said Mr. Hough. The lime and cement industries should work together on the mortar problem, he added, and they should advocate the use of the 2:1:9 mixture adopted by the association a few months ago.

With the view of educating possible lime users in the advantages of lime, the association has organized educational sales meetings for the seven or eight score lime salesmen on the eastern seaboard. Before lime can be sold, said Mr. Hough, a demand for lime must be created, and he cited the use of lime on certain big dam projects as being due to the industry's having sold the lime idea to the engineers. The field for lime in the construction industry is large enough, if properly developed, to give the lime industry much-needed relief, is Mr. Hough's opinion.

Like all other trade associations, the lime organization is struggling against the indifference of many lime manufacturers who do not support its work. As Mr. Hough stated the problem, 40 per cent. of the industry is paying the cost of publicity, research and legal work that benefits the entire industry. In his opinion industry must seek to accomplish two things through organization work: (1) To pay a wage that will support the present standard of living, and (2) to make a profit on the product it supplies.

Lee S. Trainor, the association's new construction engineer, has established a policy of sending lime manufacturers frequent bulletins regarding govern-

ment specifications, said Mr. Hough. This is the first step in a program designed to make the association of still greater value to its members.

In discussing "Essential Properties of Mortar in Brick Masonry," L. A. Palmer, research associate of the American Face Brick Assn. at the U. S. Bureau of Standards, offered the results of careful investigation of the value of various mortars, based on a study of water transmission or penetration. He advised the lime industry to study the problems of masonry. He quoted from the *Encyclopædia Britannica* to the effect that "sound well-burned brick set in good lime mortar will last for centuries."

As symptoms of excessive water penetration he names: (1) Efflorescence, (2) damp wall interiors, and (3) disintegration. As the chief cause of excessive water penetration he names the lack of permanency of adhesion of the mortar to the bricks. The permeability of the mortar or the brick has little to do with it.

Thus, tests showed that a certain brick and a certain mortar required 2 min. for water sprayed on the outside, under a hydrostatic pressure equal to wind at 80 mi. per hr., to wet the inside. Yet, water applied under the same conditions to an 8-in. wall, made up of two rows of the same kind of mortar, did not pass through it in less than 3 or 4 hr. This proves, he contended, that the water does not pass through the brick and the mortar but between them. The results cannot be blamed entirely on poor masons' work if the fault lies in the materials, as these tests seem to indicate. For the best results the mason must have a soft plastic mortar.

To the assertion that lime mortar shrinks more than other mortars, Mr. Palmer replied that it does shrink materially during hardening, but that it hardens slowly, and, after hardening, shrinks very little. There is no alternation of shrinkage and expansion as occurs with cement mortars, he said.

Additional evidence of the value of lime mortar was given by Stanley Newman, waterproofing engineer of Boston, in his discussion of "Repairing Leaky Masonry." The fact that the insides of leaky walls are never wet all over but only in spots demonstrates, in his opinion, that the leakiness is never due to absorption. According to him, the presence of water indicates the presence of shrinkage cracks and voids, which can be so small as to be invisible until wetted by a hose. He recommends the use of a mortar having plenty of lime and workability. Bed joints generally cause less trouble than end joints, as the weight and tamping of the bricks tends to eliminate the voids and press the mortar into the pores of the brick. North and east walls of the upper floors leak most.

In the absence of Thomas S. Holden, vice president, F. W. Dodge Corp., his paper on "What To Expect in the Construction Field" was read by Truman S. Morgan of the Dodge company. Mr. Holden made a strong plea for maintaining real wages, not dollar wages, pointing out that the dollar has greater buying power than formerly and that wages should be adjusted accordingly. He stated, as evidence of activity in the construction field, that, between March 1 and May 15, no fewer than 75 projects, exceeding $1,000,000 each in value, had been announced. Public buildings now form 64 per cent of all construction work, as compared with 56 per cent formerly.

Dissatisfaction with the government's attitude toward trade practices and the unsuitability of existing anti-trust laws were the important points in "Government in Its Relation to Business," discussed by Abram F. Myers, Washington attorney. He said that few men working on the problems of business know anything about those problems, and that this fact is reflected in the American Bar Assn. proposal for the alteration of present anti-trust legislation which will be put before the next Congress. This proposal would clothe the Federal Trade Commission with the authority to pass upon the legality of certain proposed trade practices before their adoption and to approve practices already established. It does not provide for the appointment of business men, economists or experts as members of the commission, but leaves the membership of the commission as at present. The worst feature of the proposal is the fact that it would place the delicate matter of trade practices in "the welter of political action."

In its anxiety to prevent price fixing, the commission has ruled against the use of the base-price-list rule in one industry, said Mr. Myers, although this practice has been an essential feature of that business for years.

On the subject of wages and prices, Mr. Myers made the statement that, if wages are to be maintained, prices must be raised, and, conversely, if prices are to be maintained, wages must be lowered. To maintain wages at their present levels, a little judicious price fixing may be necessary, and, in order to accomplish this, executive intervention and the exercise of discretionary power by the president, as occurred in the case of the United States Steel Co. and the Tennessee Coal & Iron Co. merger, may be required. He lamented the fact that, at a time when trade-association work is of the greatest value to industry, business men should fail to attend in greater numbers their trade-association meetings.

Otho M. Graves, vice-president, General Crushed Stone Co., was scheduled to speak on "Reducing Accidents Through Self-Insurance" but, unfortunately, was unable to attend. In his stead R. P. Blake, of the Independence Bureau of Philadelphia, gave some particulars regarding the experience of Mr. Graves' company. By means of a type of insurance policy, under which the policy-holding company bears the first $10,000 of loss and the insurance company the remainder up to $250,000, the annual cost to the company is $5,000. Protection which cost $43,000 under the old plan in 1928 cost only $21,000 under the self-insurance plan. Further protection, which in 1929 would have cost $49,000 under the old plan, cost only $32,000 under the new. The 1930 figures were $56,000 and $24,000 respectively. In three years, therefore, protection which would have cost $149,000 under the old plan, according to insurance-company rates, actually cost the company only $77,000 under the self-insurance plan—a saving of $72,000 in the 3-year period.

The fact that the company, under the new plan, must bear the losses resulting from accidents increases its interest in accident-prevention work and is largely responsible for the savings effected, Mr. Graves says. Self-insurance helps in reducing accidents because it saves the company's money rather than the underwriter's money. The company operates 14 crushed-stone plants and 3 sand-and-gravel plants, employing in all, about 1,000 men, and it has applied the self-insurance plan throughout its organization, accomplishing good results in plants employing as few as 50 men. The company has set aside 4 per cent of its pay-roll, about $25,000, as a reserve. Mr. Blake thinks that 2 or 3 per cent would be fair for average conditions. In making payments for claims, Mr. Graves follows closely the requirements of the law, avoiding excessive liberality for fear of establishing a precedent, according to Mr. Blake.

Attractive possibilities for the sale of lime seem to be offered by the field of sewage treatment. In discussing "New Developments in Sewage Treatment," W. V. Brumbaugh, assistant secretary of the association and a chemical engineer, drew attention to the findings of the Chlorine Institute and its advocacy of lime as an aid to chlorine. Lime has been sold to a limited extent for use in altering the alkalinity of the sludge. New developments recently announced by L. H. Enslow of the Chlorine Institute, seem to indicate the advisability of adding lime in conjunction with the chlorine. The result of the mixture of lime and chlorine is calcium hypochloride. Further information will be available in an early issue of PIT AND QUARRY.

"Better Business Through Better Methods" was the theme of an inspiring address by Charles F. Abbott, executive director, American Institute of Steel Construction. Himself a trade-association man, he was ruthless in his condemnation of what he termed the "non-coöperators" or "free riders," those manufacturers who, while sharing in the benefits of trade-association work, refuse to bear their share of the burden. He drew a very vivid picture of the evils of price cutting by relating the story of two backwoodsmen who, when the construction of a new highway forced travelers to detour past their cabins, agreed to pull mired motor cars from the holes at $5 apiece. Everything went well until, suddenly, one man found himself without work while his erstwhile "comrade," partner to the price agreement, was busy day and night. On investigation he found that his friend had cut the price to $2.50, so, in retaliation, he decided to rescue the mired travelers without charge. As a result, his friend has nothing to do, while he is frantically busy without profit in his desire to teach his former "pal" a lesson.

In Mr. Abbott's opinion, legislation will not cure the weaknesses of mankind; the remedy lies in the hands of business men themselves. And, he added, "if industry will not clean house, the government will do it for us." He believes that unemployment cannot be cured unless business can make a profit. In referring to the construction outlook he said that, up to May 20, public projects totalling $6,143,894,957 had been planned and that contracts for $1,622,992,651 worth of work had been placed, an increase of more than $25,000,000.

A notable contribution to the discussion of price cutting was made by the presentation of a playlet entitled "Merchandising Lime." This was written by Lee S. Trainor, based on incidents witnessed by Mr. Hough in the office of a prominent company, and was enacted by members of the association. Lee S. Trainor played the part of the thinking salesman, who converts a cement-mortar-minded architect (Henry A. Huschke) to a belief in lime mortar and succeeds in getting him to specify it on his next job, only to lower his price, under the influence of a competitive bid, from $20 to $15 a ton. The contractor (Donal O'Connor) and his assistant (W. V. Brumbaugh) maneuver the competing lime salesmen (George I. Purnell and Henry A. Huschke) and the patent-mortar salesman (R. P. Stiles) into a position which results in a profit of $1,000 to the contractor on his order for 200 tons of lime. The moral is shown in the remorse of the sales manager (Norman G. Hough), who, himself responsible for authorizing his salesman to make the cut that lost the sale and cost the lime makers $1,000, keenly regrets his action and resolves never again to cut the price.

In spite of little time for preparation and a change in roles, on a few hours before the performance, the participants played their parts with a realism and a lack of affectation that might well be imitated by professionals on the so-called legitimate stage. The play, although modestly conceived and modestly performed, dealt with a situation of which everyone present had had experience, and it conveyed to the audience, as no undramatized appeal could have done, the absurdity of price cutting, the weakness of the price cutter, and the evil effects that result. There are few conventions that could not be greatly improved by the depicting, in dramatized form, of some equally glaring trade abuse.

After approval of the budget for 1931-1932, the following directorate for the same year was announced: Dist. 1, C. L. Montgomery and C. C. Loomis; Dist. 2, S. W. Stauffer and Philip L. Corson; Dist. 3, Ray C. Noll; Dist. 4, James M. McNamara; Dist. 5, no announcement; Dist. 6, G. J. Nicholson; Dist. 7, B. L. McNulty and E. S. Henley; Dist. 8, no announcement; Dist. 10 and 11, F. C. Cheney; Dist. 12, J. F. Pollock; Dist. 13, I. A. Ogden; Dist. 14, J. T. McMillan; Dist. 15, R. E. Tremoureux.

The newly-elected directors then met and elected the following officers: President and general manager, Norman A. Hough; chairman of the board, B. L. McNulty; secretary-treasurer, R. P. Wilton; assistant secretary-treasurer, W. V. Brumbaugh. The new executive committee includes J. Deely, Reed C. Bye, H. B. Mathews and J. G. Gager.

The following representatives of lime manufacturers, the association, equipment manufacturers, and the trade press, were present:

John F. Benton, Kent Mill Co., Brooklyn, N. Y.

R. C. Brown, Western Lime & Cement Co., Milwaukee, Wis.

W. V. Brumbaugh, National Lime Assn., Washington, D. C.

Reed C. Bye, Warner Co., Wilmington, Del.
W. E. Carson, Riverton Lime Co., Riverton, Va.
George L. Connell, Limestone Products Corp., New York, N. Y.
C. H. Corbett, Valve Bag Co., St. Louis, Mo.
Bolton L. Corson, G. & W. H. Corson, Plymouth Meeting, Pa.
F. C. Dillon, E. Dillon's Sons, Inc., Indian Rock, Va.
L. P. Dillon, E. Dillon's Sons, Inc., Indian Rock, Va.
Burton A. Ford, St. Regis Paper Co., New York, N. Y.
L. H. Hartman, St. Regis Paper Co., Toledo, O.
W. R. Hazzard, Warner Co., Philadelphia, Pa.
Norman G. Hough, National Lime Assn., Washington, D. C.
H. A. Huschke, National Lime Assn., Washington, D. C.
I. O. Kebler, Riverton Lime Co., Riverton, Va.
William J. Kuntz, Blaw-Knox Co., Pittsburgh, Pa.
H. B. Mathews, Mississippi Lime & Material Co., Alton, Ill.
A. R. McNamara, Eagle Rock Lime Co., Eagle Rock, Va.
James H. McNamara, Eagle Rock Lime Co., Eagle Rock, Va.
Bernard L. McNulty, Marblehead Lime Co., Chicago, Ill.
Charles L. Montgomery, Vermacco Lime Co., West Portland, Vt.
Ray C. Noll, Whiterock Quarries, Bellefonte, Pa.
Donal O'Connor, Rockland and Rockport Lime Corp., Rockland, Me., and Hoosac Valley Lime Co., Adams, Mass.
I. A. Ogden, Dittlinger Lime Co., New Braunfels, Tex.
William Paxton, Rockdale-Corson Lime Co., Strasburg Jct., Va.
S. A. Phillips, PIT AND QUARRY, Chicago, Ill.
J. F. Pollock, Ash Grove Lime & Portland Cement Co., Kansas City, Mo.
E. C. Powers, Marble Cliff Quarries Co., Columbus, O.
G. I. Purnell, American Lime & Stone Co., Bellefonte, Pa.
Col. W. Fred Reynolds, Whiterock Quarries, Bellefonte, Pa.
N. C. Rockwood, *Rock Products*, Chicago, Ill.
S. M. Shallcross, American Lime & Stone Co., Bellefonte, Pa.
David K. Shroyer, H. E. Millard, Annville, Pa.
Walter Stauffer, J. E. Baker Co., York, Pa.
Richard B. Stiles, Jr., Warner Co., Philadelphia, Pa.
Lee S. Trainor, National Lime Assn., Washington, D. C.
Charles Warner, Warner Co., Philadelphia, Pa.
Irving Warner, Warner Co., Philadelphia, Pa.
D. E. Washburn, American Lime & Stone Co., Bellefonte, Pa.
E. D. Williams, H. E. Millard, Annville, Pa.
F. M. Wilton, Steacy & Wilton Co., Wrightsville, Pa.
R. P. Wilton, Steacy & Wilton Co., Wrightsville, Pa.

The following guests were present:

Charles F. Abbott, American Institute of Steel Construction, New York, N. Y.
Mrs. Norman G. Hough, Washington, D. C.
W. H. Lumsden, Southern Lime Producers' Assn., Atlanta, Ga.
Mrs. H. B. Mathews, Alton, Ill.
Truman S. Morgan, F. W. Dodge Corp., New York, N. Y.
Stanley Newman, Stanley Newman Co., Boston, Mass.
Mrs. Ray C. Noll, Bellefonte, Pa.
L. A. Palmer, American Face Brick Assn., U. S. Bureau of Standards, Washington, D. C.
John Paver, Outdoor Advertising Assn., Chicago, Ill.
Mrs. S. A. Phillips, Chicago, Ill.
T. G. Weck, West Virginia Pulp & Paper Co., Covington, Va.

A. R. B. A. Proposes Master Plan of Highway Administration

OBVIOUSLY this country's highway system would benefit by centralized planning, and apparently there is a trend in this direction in the more advanced sections of the country, according to a recent committee report of the American Road Builders' Assn., made by T. H. Cutler, state highway engineer of Missouri, chairman. Complete control by states of all highway construction and maintenance is undesirable.

A large percentage of the mileage is local and must necessarily be financed from local sources. The relationship which exists between the United States Bureau of Public Roads and the states could well be followed by states in their relations with the smaller subdivisions.

The conclusions of the report follow:

1. A master highway plan by the state, embracing the entire mileage included in the state and based on engineering-transportation surveys, which include studies of population, economic conditions and the development of a continuous system, should be developed.

2. The highway administrative structure should be composed of but three operating units: state, county (or consolidated county district), and city.

3. If state funds are allocated to counties and cities, the distribution should be based on transportation surveys. Funds should be expended on through highways necessary for the completion of a connecting system.

4. State-highway financing by county-aid should be eliminated.

5. The use of gasoline tax funds and registration fees for other than highway purposes should be eliminated.

6. Simplification of present street and highway administration by consolidation is desirable wherever possible.

7. Highway districts, operating and financing separately within counties, should be eliminated.

8. A plan of highway financing and administration, which tends toward centralization of planning, which permits simplified financing, which combines financial resources, which curtails unnecessary personnel, which permits budgeting, and which is dictated by existing conditions rather than by those existing a century ago, should be developed.

9. A system which will ultimately result in connecting highways regardless of political boundaries should be adopted.

10. State requirements to apply to county-highway operation in a manner similar to the supervision exercised by the Federal government in the state should be adopted.

11. Gasoline taxes and license fees should be levied solely by one jurisdiction—the state.

12. Where highway development is in its early stages and urgent necessity exists for better highway transportation, immediate relief can be secured only by the sale of bonds. State bonding for highways has in every instance been a paying investment.

13. The use of current funds for highway construction is recommended where highway systems are mostly completed and where maintenance and reconstruction are the principal factors.

(Continued on page 54)

Strict Rules of Safety to Be Observed in Quarrying and Crushing

Experience in Accident Prevention as Compiled by National Safety Council

EVERYONE from the highest executive to the lowest worker, must take an active interest in the safety of a plant if successful results are to be obtained. The superintendent cannot put safety across unless his manager or president shows by his actions that he is in sympathy with the safety of the men. When given this assurance, the superintendent by his own actions can show his foremen that he considers safety must be given the proper consideration. The foremen, in turn, can demonstrate to the men that they believe in safety. An understanding will thus be created which will convince the employee that a sincere attempt is being made to make his job safe and safety will become the watchword of all.

When a code of rules has been adopted those in authority should set a good example to those under their charge by living up to the rules. It will not then be difficult to require the workers to obey the rules. If foremen and others visit neighboring quarries and crushing plants much benefit will be obtained from the exchange of ideas and from what is actually seen in those places.

It is not the purpose of this article to deal with safety organization, but rather to touch upon some of the hazards attending the operations of quarrying and crushing stone. Safe practices are now generally taught. It is assumed that rules governing safe operations are impressed upon the minds of the workers and that in especially hazardous cases rules printed in several languages are posted in conspicuous places for their benefit.

The first step in manufacturing processes involving the use of stone is made in the quarrying department, and possibly offers as many hazards as the succeeding processes or stages altogether. For this reason alone too much care cannot be taken.

Every operation of the quarry should be worked out carefully in detail before the work is started. There is no place in quarry operation for unsafe practices or methods. Only persons who will perform their duties in a safe manner should be employed.

The principal operations of the quarry are: (1) Stripping; (2) Drilling; (3) Blasting; (4) Digging and Loading; (5) Transportation; (6) Crushing.

Stripping

Stripping of overburden, necessary in all but a few quarries, is not always considered one of the major operations, although it presents many opportunities for accidents. Whether water is used to wash the overburden from a deposit, or the overburden is removed by means of shovels and cars, or other methods, there is always considerable equipment to keep in safe operating condition. The top of the stone should be kept neat and orderly. Useless parts, old ties, etc., are a menace to the safety of the men. Good housekeeping will not only prevent many injuries to the men, but also increase their protection. A good foreman, one who is alert to changing conditions and who will plan his work carefully, is a most valuable asset to the department. He should be a member of the safety committee and take an active part in its work.

Fig. 1. Levelling off stone before secondary drilling.

Examination of equipment is most necessary. A broken strand of a cable, loose bolts and machinery, and other seemingly small defects are often the cause of wrecks that result in injuries. It is well to strip back a safe distance from the face of rock to be removed—otherwise loose rocks, or boulders may fall on the men working below. This will also tend to give confidence to the men who are removing rock on the quarry floor. Men scaling the face of rocks should be required to use life lines, and such lines should be inspected before being used. Lines should also be protected by a rubber hose slipped over the line as a safeguard against chafing or being cut through by coming in contact with the sharp rocks.

Drilling

Primary Drilling: Drillers, like other employees of quarries, suffer injuries from accidents. Close attention to the operation is essential always. Thinking of other things and temporarily letting

Fig. 2. Secondary driller should take time to get a good foothold.

the mind wander has resulted in accidents more than once. For example, reaching for the wrong lever may result in raising the bit instead of the bail, bringing confusion that may cause an accident. Gauging the height to raise the bit is an important part of the work. Raising it too high caused an accident whereby a foot was lost. Allowing too much slack after resting the bit on the floor caused one death, due to the bit swinging around and squeezing the operator. Careful examination of clutches, especially, and all other parts of the drill is an important part in the prevention of accidents.

Secondary Drilling: Jack-hammer drill operators work on the face of the rock or in the quarry proper and are subject to various hazards. Danger of injury from the drill itself is somewhat remote unless caused by bursting of hose or fittings on or near the drill. One serious hazard in this operation is the possibility of the bit breaking in the shank or stem. When this occurs, the drill is apt to fall on the operator's foot. The operator should always have this in mind, especially when starting holes. The chief hazards of the work are those of sliding or creeping rocks above the men or the movement of rocks which they may be drilling. Loose rocks must be pulled down in advance of the operator's work. (Fig. 1.) Secondary drillers should always stand facing the quarry face so that if any rocks should slide down the face they will be more easily and quickly warned than if they stand with their back or side to the face of the quarry. (Fig. 2.) Where there is danger of flying rock or similar conditions, the use of goggles by the secondary drillers will prevent eye injuries. The clothing worn should be close fitting, particularly at the trouser bottoms. The use of "hard-boiled" hats has also prevented many serious injuries to the head. The presence of drillers must always be kept in mind by the blasters. Unrelenting vigilance is necessary for their safety. (Fig. 3.)

Blasting

General. Too much emphasis cannot be placed on the safe handling of explosives and blasting accessories. A thoroughly qualified and experienced man should be placed in charge of blasting, and of storage and transportation of all explosives and supplies. Any person handling explosives or engaged in blasting should be authorized to do so by the man in charge.

Storing—Keeping. All explosives should be stored in magazines which are of approved construction and which are safely located with reference to other buildings, railroads and highways. All explosives magazines should be clean, dry and well ventilated. Information regarding proper construction of magazines and about safe distances can be obtained from the Institute of Makers of Explosives, or from any explosives manufacturer.

All explosives should be kept under lock and key and a record should be made when they are issued for work.

No matches or flammable materials, such as oils, gasoline, paint, carbide, oily waste, etc., or metal or metal tools, should ever be brought into a magazine containing explosives. Floors should be kept clean, free from loose explosives, and no nail or bolt heads should be exposed.

No artificial light, other than an electric storage-battery lantern, or an electric flash light, should be permitted in a magazine.

No fire or sparks should be allowed near a magazine, and the ground around it should be kept clear

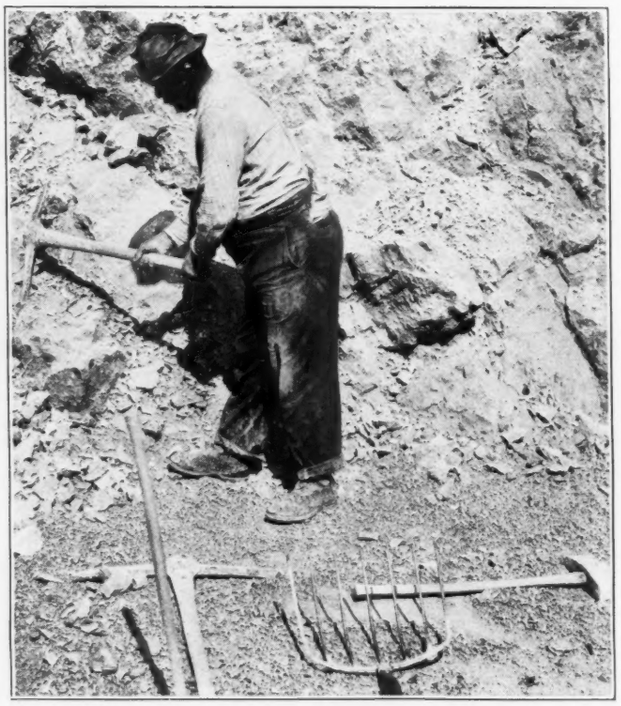

Fig. 3. If this man tries to run from falling rock he is sure to trip over the carelessly strewn tools.

of brush, leaves, grass, debris or other flammable material. Do not leave any explosives exposed to the direct rays of the sun.

All explosives should be stored in such a manner that the oldest stock will be taken out first.

Dynamite should be stored top side up with the brand showing to the front. Black blasting powder should be stored in such manner that the keg bungs are down, or so that the seams are down. Black blasting powder and dynamite may be kept in the same magazine. It is recommended that Cordeau be stored in the dynamite magazine rather than the blasting supplies magazine, because the former building is usually better protected against temperature changes. Under no circumstances should dynamite or black powder be stored in the same magazine with ordinary or electric blasting caps.

Fuse may be stored either in the dynamite magazine or in the blasting supplies magazine. It should be kept in a cool, dry place.

When magazines require any repairs on the inside of the building, all explosives should be removed to a safe distance and protected. Floors should be thoroughly cleaned in an approved manner before any work is done on them.

Under no circumstances should packages of explosives be opened in a magazine. They should be removed to a suitable place at least 50 feet away from the magazine. When opening high explosives cases, use only wooden wedges, and wooden, fibre, or rubber mallets.

Explosives and blasting supplies should never be kept in any place where animals, unauthorized persons, or children can get at them. Many hundreds of children have been killed or crippled because they obtained detonators from such sources.

Fig. 4. Use of an iron rod when tamping may cause a spark and result in a serious injury.

Fig. 5. Wrong method of setting fuse which often results in premature blast.

Transportation. Do not throw packages of explosives violently down or slide them along floors, or over each other, or handle them roughly in any manner.

Vehicles for the transportation of explosives should be constructed so that the inside of the body is of wood or other suitable material, free from exposed nails, bolts or other metal parts.

Before wagons or trucks are used in transporting explosives to and from magazines, their bodies should be swept clean. Blasting caps or electric blasting caps should not be transported in the bed or body of a wagon, or truck, or other such vehicle, or in a railroad car, with other explosives, nor should blasting caps, electric blasting caps, or other explosives be transported in the same vehicle, railroad car, wagon, truck, etc., with metal, metal tools or matches, or other flammable material. A separate box should be provided exclusively for carrying caps and fuse or electric blasting caps from a magazine to the operation.

Thawing. Since almost all explosives companies are now manufacturing low freezing explosives, there is practically no need for the use of thawing houses if the proper grades of explosives are selected. If, however, small quantities of explosives require thawing, the thawing kettle should be used. Water must never be heated in the thawing kettle, and should never be put into the water jacket of the thawing kettle when hot enough to burn the hand. The high explosives compartment should always be kept dry and should be empty when the hot water jacket is filled.

Never attempt to use frozen high explosives. Never attempt to thaw high explosives by putting them in hot water or steam, on or over hot steam pipes or boilers, or in a stove, in an oven or on any hot metal surface. Never attempt to thaw high explosives by holding them near a flame, or before an open fire, or by placing them on hot sand, brick, stone, etc.

Fig. 6. Stop-and-go lights and signs warn traffic not to enter quarry during blasting operations.

Priming. When cap and fuse are used the proper length of fuse should be cut from the roll and the blasting cap crimped to the freshly cut end of the fuse with a suitable cap crimper, not with a knife or the teeth. Be sure that the fuse is cut squarely across, and that the end is pushed gently against the high explosive material in the blasting cap. In wet work, cap-sealing compounds made for the purpose—but not oil—should be spread over the joint between the fuse and blasting cap. Punch a hole about the size of a lead pencil either in the end or the side of the cartridge, this hole to be a little deeper than the length of the blasting cap. Insert the blasting cap and fasten the fuse securely to the dynamite cartridge by means of a piece of string or friction tape. The blasting cap should be well imbedded in the dynamite and should be as nearly parallel to the axis of the cartridge as possible.

When electric blasting caps are used, punch a slanting hole from the center of one end of the cartridge so that it comes out through the side about two inches from the end. Fold over the wires about twelve inches from the electric blasting cap to form a sharp bend. Then push the folded wires through the hole, starting at the end of the cartridge and coming out through the side. Open the folded wires and pass the loop over the other end of the cartridge. Punch another hole straight into the end of the cartridge beside the first, insert the electric blasting cap in the hole and take up all slack in the wires. Methods of making primers are illustrated in folders furnished in all dynamite cases.

Where Cordeau is used for firing well-drilled holes, it should be laced through a cartridge of dynamite avoiding all sharp kinks.

Charging—Loading. All loading should be under the supervision of a qualified person. His plans for a shot should be worked out in such a way that loading and firing can be carried on without undue haste or interruption. No one should be allowed to smoke, nor to have matches on his person, while engaged in loading and blasting, or in handling explosives. No unauthorized person should be allowed near the hole while loading or tamping.

Holes should be cleared of hanging stones, etc., before loading is started. Tamping should be done with wooden blocks or wooden tamping poles without metal parts exposed. (Fig. 4.)

When enlarging a drill hole (springing) for pocket loading, the electrical method of firing should be used. Holes should be allowed to cool before loading more explosives in them.

Deep well holes are usually primed either with electric blasting caps or Cordeau. Care should be taken in loading and tamping that the wires or Cordeau are not kinked or injured. (Fig. 5.) Explosives should be loaded in such manner that they are not subjected to severe shock or friction.

Wherever practical the block-hole method is recommended for secondary shooting rather than mud capping.

Firing. Where cap and fuse are used for firing a large number of shots, all fuses should be exactly the same length. Fuses should be cut sufficiently long to permit the blasters to light the entire number and get away to a point of safety.

The use of a pilot detonator and fuse is recommended when lighting a large number of fuses. The pilot fuse should be lighted just prior to lighting the fuses in the shot. The pilot fuse should be enough shorter than the other fuses in the shot so that the men lighting the fuses will have sufficient time to reach a place of safety after the pilot detonator explodes.

In electrical firing the ends of all wires should be scraped bright and clean before connections are made. Bare connections should be kept off the ground or away from water in order to reduce possibilities of current leakage. Leading wires should be kept in good condition. It is recommended that two single leading wires be used rather than duplex wire.

Electric current for firing a blast should be supplied by a blasting machine or power line of sufficient capacity. With a blasting machine, only straight series connection should be used. Where a power line is used a parallel connection is usually employed, but the proper connection depends on the characteristics of the current. If alternating current is used it should not be less than 45 cycles.

Where Cordeau is used for firing, all connections should be made in the approved manner. An electric blasting cap or ordinary cap and fuse can be used for firing with Cordeau and should be attached to the Cordeau by means of a union.

Before firing is to be done a distinctive warning signal should be sounded. It is necessary that every man working in the quarry be familiar with this signal. Where quarries are located close to highways, railways or buildings, all persons should be warned, and traffic approaching from all directions should be stopped. (Fig. 6.) In primary blasting the quarry should be cleared of all the men. For secondary blasting safety shelters made of boiler plate or sections of old stacks or bins should be provided at convenient locations so that the men can

retire into them. A man should not lean against the side of these shelters during blasting, as he may be seriously injured if a flying stone hits the shelter at the point where he is in contact with the wall.

After the person in charge of blasting has assured himself that all men have reached a place of safety, the blast may be fired. If a blasting machine is used it should be operated as forcibly as possible. If a power line is used as the source of current, the circuit should be provided with a special locked switch which is used only for the purpose of firing.

No one should return to a blast until all the rock has stopped falling and until the smoke has cleared away.

Loss of time and danger of accidents can be reduced by limiting the blasting to two periods of the day—noon and evening—when most of the men have left the quarry.

Misfires. In some states there are laws governing procedure in case of misfires. These laws should be complied with in every respect. In case no laws exist, or where the law does not fully cover a situation, misfires should be handled by the man in charge of the blasting according to his best judgment.

The handling of misfires must be considered hazardous and every possible precaution should be taken to prevent their occurrence. When a charge of explosive fails to fire through the use of electric detonators, the leading wires shall be disconnected from their source of electric energy, and the place where the shot has failed to explode must not be visited within thirty minutes. The leading wires and the detonator wires should then be carefully examined for breaks and loose connections, and after these are repaired another attempt should be made to fire the shot. When a charge of explosive fails to fire when cap and fuse are used the place at which the failure occurred should not be visited for a period of at least one hour.

Digging and Loading

Reference under this head is made to those operations which comprise the care of the quarry floor proper. Loading of stone can be done neatly just as well as not, and when done so the quarry will present a safe place in which to work. Ridges of loose stone lying along loading tracks, old pipe, timbers and worn out machinery are a menace to the safety of workers. It costs little to remove these hazards and they should not be permitted.

There are quarries whose floors are as level as though they had been graded. High spots offer opportunities for stumbling. Holes are traps for men to fall into and sprain ankles. Accidents are recorded from both conditions.

Recently several accidents have occurred around the front end of shovels. Operators of shovels will do well to bear in mind the safety of pit men and others. On the other hand, the latter should be alert and take no chances. Shovels are somewhat human in their actions but they cannot warn us to keep away.

Fig. 7. Riding quarry dump cars is a dangerous practice.

With the introduction and use of electricity in quarries, we have electric hazards together with those of the usual mechanical equipment to safeguard, and it behooves us, therefore, to keep constantly in mind the possibility of accidents arising from the use of these various kinds of equipment.

In many quarries the shovel equipment is operated by 550-volt apparatus. In these quarries a super-service cable is usually employed. This cable is sometimes allowed to lie on the quarry floor and when the shovel is moved the cable is dragged along with it. The best practice is to elevate the cable on portable cross arms. When the shovel is moved the cable should be supported by several workmen so that cuts will not be made in it by dragging it over sharp stones. Rubber gloves should be worn by the workmen when they have any contact with the cable by lifting or otherwise. In any case, frequent inspection should be made of the cables for cuts in the insulation and any such defects should be corrected.

The face of the quarry cannot be inspected too often for the safety of the hammer drillers, blasters and shovel crews. Loose stones should be barred down in advance of these operators whenever possible.

Rains, freezing, thawing, vibrating of machinery and daily blasting, all tend to keep blasted rocks creeping or moving and these are a constant source of worry until removed. Runners should watch the face for moving stone. Crawler attachments are valuable in permitting the moving of shovels out of danger.

Visitors, and others not directly connected with quarry operations, should not be permitted around the premises.

The value of good housekeeping cannot be stressed too strongly. Wherever good housekeeping prevails accidents are reduced to a minimum.

Transportation

Statistics have been published showing that (excepting accidents caused by handling objects) the greatest number of accidents are due to rolling

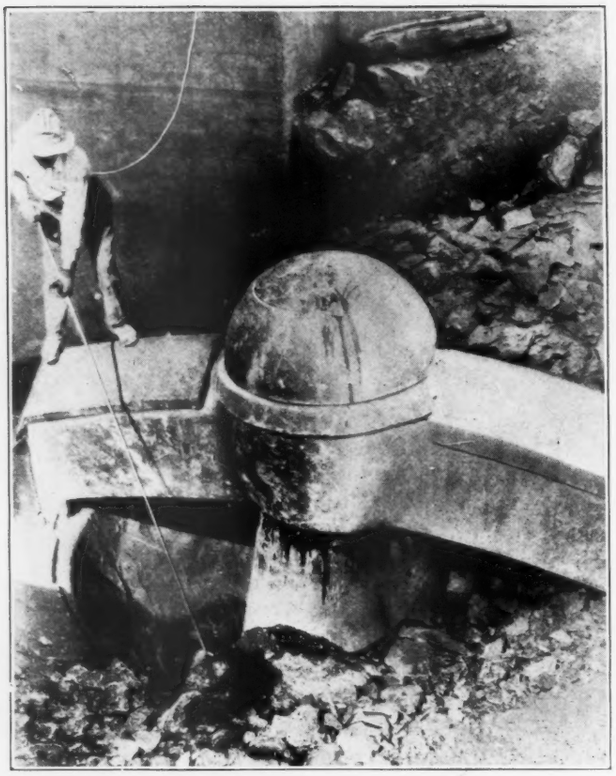

Fig. 8. Gyratory crusher and workman with safety belt and secured life line.

equipment, including falling and slipping under cars. Good housekeeping and common sense will here play an important part in the reduction of accidents.

Chocking of cars with wood or stone is a practice that should be discouraged. More than one man has had his hand drawn down or squeezed in this operation.

No definite sets of rules can be adopted to apply to all cases. Tracks should be kept in good repair. Frogs and switches should be of the standard type. Switch levers of a type operated at right angles to the track should not be used. If such equipment is already installed it should be replaced as soon as practicable with switch levers which operate parallel to the track rails. Short sections of rails should not be used unless it is really necessary to do so. All tracks should be well ballasted. Inclines should be provided with a walk-way on one side. Walking of tracks should not be permitted. Debris and objects should not be permitted to accumulate near tracks. In some cases men have stumbled and have fallen under moving trains of stone cars—in one case a man was almost decapitated. Much has been done to reduce accidents, but there is room for still more improvement.

A number of causes contribute to the toll of accidents. Among these are overloading of cars, uneven loading, rough tracks, heavy grades, use of side dump cars with high center of gravity, coupling cars, breaking of couplings and pins, defective brakes, and other causes. Not the least among causes are the hurry and eagerness to obtain production.

Riding of cars by anyone except members of the train crew is a dangerous practice and should be strictly prohibited. (Fig. 7.) Under no circumstances should anyone ride on the end sills of cars in motion. When riding cars, brakemen and other members of the train crew should face the direction in which the cars are moving, and be in full view of the engineman so that any signals given may be plainly seen by him. Brakemen should stand as far from the edge of the car as possible. They should not sit on the brake wheel, nor should they ride with their feet on brake rigging, journal boxes, truss rods, or similar unsafe footings. Cars not supplied with automatic couplers should be coupled by means of a stick or hook, never by the hand or push of the foot. (See Safe Practices Pamphlet No. 48, "Railroads in Industrial Plants.")

There have been accidents caused by cables breaking on inclines and coupling pins jumping out of place due to jerking of the cars. Carelessness and neglect are in most cases responsible for accidents caused by the above conditions. Better instructions, and in some cases doing today what we are inclined to leave for tomorrow will be helpful and pay good dividends. One company provides a loud siren at the hoist operator's station, which may be sounded by the hoist operator, but only in cases of the hoist cable breaking or of some similar danger.

Crushing

Much has been printed about accidents, usually fatal ones, occurring around crushers. Cases have been reported where men have been thrown into gyratory crushers by stones leaving the cars that were being dumped. There is absolutely no excuse for the design of any crushing plant requiring an employee to get close enough to the crusher to be thrown in while cars are in process of dumping. On the other hand, there is certain work to do around crushers that entails some danger of accidents. Heavy toeboards or brakes are not recommended unless placed sufficiently far back to give the employees a chance to work between them and the crusher without risk of stumbling.

The use of larger gyratory crushers, or other types of crushers served with feeders, will do much toward eliminating crusher accidents. However, many small crushers are used which introduce the hazards of punching mud and rearranging of cascading rocks. When cascading is broken up by lifting large rocks with hoist and chains, it can be done best by pulling the chain under the stone with a long, light rod having a hook at the end. The chain can then be pulled up and fastened. It is best to stop the crusher a moment for the operation. If these rules are followed the hands and arms will be safe and there is no danger of the feeder falling into the crusher.

Crusher men who are called upon to punch or to sledge rocks to make them fall into the crusher should use suitable safety belts. (Fig. 8.)

The other mechanical equipment in the crusher building can be safeguarded in the customary way, and with constant teaching of safety rules and their

(Continued on page 48)

New Drilling and Blasting Method Used in Shot at John T. Dyer Quarry

Drive Tunnels and Laterals from 6-Foot Shaft Sunk 132 Feet from Face of Cliff

THE Monocacy, Pa. quarry of John T. Dyer Co. has numerous unusual features. Because of these, this quarry was selected by the U. S. Bureau of Mines as one of the plants whose operating costs would be published in detail, as a bulletin in a series dealing with the non-metallic mineral industry. The preparation of this analysis was by Joseph A. Conway. It was released as Information Circular 6405, which was abstracted at length in the Feb. 25, 1931 issue of PIT AND QUARRY. The article, among other things, described the evolution of drilling and blasting practice in the Monocacy quarry, to improve efficiencies in breaking the refractory trap which locally occurs as dikes filling vertical fissures in the sedimentary measures and as sheets intruded among these measures. The trap contains faults that lie at a dip of about 45 deg., as well as a main series of joints that are nearly vertical.

Two practices are described in the previous publication—the ordinary deep churn drilling with the blasting of a line of holes, and the tunneling or gophering system in which, with a blast that was fired April 30, 1930, approximately 300,000 tons of rock was dislodged. The John T. Dyer officials have progressive ideas and the following description pertains to its last big blast, on March 24, 1931, which is believed to be the first of its kind ever attempted in this country.

The plan followed was conceived by William A. Kelly, recently deceased, who was, for many years, general superintendent of the quarry. It was executed under the supervision of du Pont technical men. Mr. Kelly had found that it was expensive to well-drill his quarry and, under certain conditions, almost impossible, since the face ran from 150 to 265 feet in height. After his first tunnel shot (at that time the largest ever fired in a trap-rock quarry) in the foot of the quarry wall, he conceived the idea of using tunnels to replace well-drill holes for the upper half. This procedure was not new, but the height of the face prohibited driving a tunnel straight in, half-way between the top and the bottom of this face, so he planned to sink a shaft in the rear to the proper depth and then to tunnel toward the face. It was his purpose, if the plan worked out successfully, to have the same shaft serve for three tunnel shots.

In following out this procedure, a shaft 6 ft. in diameter was sunk, 132 ft. from the face, and to a depth of 80 ft. A tunnel was then driven some 82 ft. forward, leaving a 50-ft. burden. From this, two lateral tunnels, parallel to the face, were constructed, the eastern lateral being 112 ft. and the western 107 ft. long.

As said, it was planned to utilize this shaft for three tunnel shots. The first of these shots is the one now described. A load of 25,000 lb. of du Pont Gelex A was placed in twelve units, spaced at the usual intervals in the lateral tunnels, the quantity in each unit being based on the rock tonnage the unit was meant to displace. The tunnel loading was only the usual method for similar jobs but, although it is the usual method to place stemming or tamping between the units, it was determined not to do so in this case. Instead, a 5-ft. reinforced concrete bulkhead was built at the intersection of the main tunnel and the lateral tunnels. There were pipe openings for the Cordeau and electric cables and for the introduction of water tamping. The water was pumped into a tank on the hill far in the rear and flowed thence by gravity into the shaft and tunnels. About 60,000 gallons were utilized.

A question in the minds of the men planning the job was as to whether or not there would be any leakage, and if so, what effect this leakage would have on the blast. It was discovered that there was only slight leakage which was remedied by turning in a slight additional quantity of water on the day of the blast. When the explosive charge was shot, with 30-ft. head of water, it functioned perfectly.

Another question was would or would not the explosive gas act on the water to injure the back tunnel and the shaft? One of the du Pont men stood within 150 feet of the shaft and the column of water rose some 60 feet above the mouth and then fell straight down without wetting the surface area for a distance more than 25 feet around. The shaft was not lodged from its position. From the face of the shot, it would appear that the angle of breakage in the rear of the lateral wall will permit the shooting of the next tunnel as planned in the future. The shot produced some 150,000 tons of stone as expected.

Marion Gravel Company Purchases Indiana Plant's Assets

Articles of incorporation have been filed with the secretary of state in Indianapolis by the Marion Gravel Co., having its principal place of business in Marion, Ind. The company recently purchased the assets of the Grant County Gravel & Sand Co. for $12,500. The company has an initial capital stock of 250 shares having a declared par value of $100 each. The incorporators were Frank L. Deer, Leon L. Deer, S. G. Cohen, L. A. Young and Walter Fudge, all of Franklin, Ia.

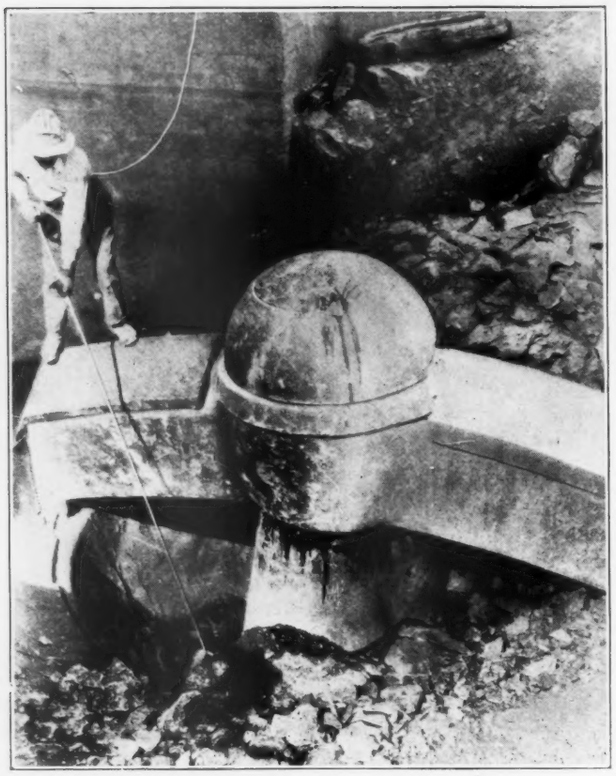

Fig. 8. Gyratory crusher and workman with safety belt and secured life line.

equipment, including falling and slipping under cars. Good housekeeping and common sense will here play an important part in the reduction of accidents.

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No definite sets of rules can be adopted to apply to all cases. Tracks should be kept in good repair. Frogs and switches should be of the standard type. Switch levers of a type operated at right angles to the track should not be used. If such equipment is already installed it should be replaced as soon as practicable with switch levers which operate parallel to the track rails. Short sections of rails should not be used unless it is really necessary to do so. All tracks should be well ballasted. Inclines should be provided with a walk-way on one side. Walking of tracks should not be permitted. Debris and objects should not be permitted to accumulate near tracks. In some cases men have stumbled and have fallen under moving trains of stone cars—in one case a man was almost decapitated. Much has been done to reduce accidents, but there is room for still more improvement.

A number of causes contribute to the toll of accidents. Among these are overloading of cars, uneven loading, rough tracks, heavy grades, use of side dump cars with high center of gravity, coupling cars, breaking of couplings and pins, defective brakes, and other causes. Not the least among causes are the hurry and eagerness to obtain production.

Riding of cars by anyone except members of the train crew is a dangerous practice and should be strictly prohibited. (Fig. 7.) Under no circumstances should anyone ride on the end sills of cars in motion. When riding cars, brakemen and other members of the train crew should face the direction in which the cars are moving, and be in full view of the engineman so that any signals given may be plainly seen by him. Brakemen should stand as far from the edge of the car as possible. They should not sit on the brake wheel, nor should they ride with their feet on brake rigging, journal boxes, truss rods, or similar unsafe footings. Cars not supplied with automatic couplers should be coupled by means of a stick or hook, never by the hand or push of the foot. (See Safe Practices Pamphlet No. 48, "Railroads in Industrial Plants.")

There have been accidents caused by cables breaking on inclines and coupling pins jumping out of place due to jerking of the cars. Carelessness and neglect are in most cases responsible for accidents caused by the above conditions. Better instructions, and in some cases doing today what we are inclined to leave for tomorrow will be helpful and pay good dividends. One company provides a loud siren at the hoist operator's station, which may be sounded by the hoist operator, but only in cases of the hoist cable breaking or of some similar danger.

Crushing

Much has been printed about accidents, usually fatal ones, occurring around crushers. Cases have been reported where men have been thrown into gyratory crushers by stones leaving the cars that were being dumped. There is absolutely no excuse for the design of any crushing plant requiring an employee to get close enough to the crusher to be thrown in while cars are in process of dumping. On the other hand, there is certain work to do around crushers that entails some danger of accidents. Heavy toeboards or brakes are not recommended unless placed sufficiently far back to give the employees a chance to work between them and the crusher without risk of stumbling.

The use of larger gyratory crushers, or other types of crushers served with feeders, will do much toward eliminating crusher accidents. However, many small crushers are used which introduce the hazards of punching mud and rearranging of cascading rocks. When cascading is broken up by lifting large rocks with hoist and chains, it can be done best by pulling the chain under the stone with a long, light rod having a hook at the end. The chain can then be pulled up and fastened. It is best to stop the crusher a moment for the operation. If these rules are followed the hands and arms will be safe and there is no danger of the feeder falling into the crusher.

Crusher men who are called upon to punch or to sledge rocks to make them fall into the crusher should use suitable safety belts. (Fig. 8.)

The other mechanical equipment in the crusher building can be safeguarded in the customary way, and with constant teaching of safety rules and their

(*Continued on page 48*)

New Drilling and Blasting Method Used in Shot at John T. Dyer Quarry

Drive Tunnels and Laterals from 6-Foot Shaft Sunk 132 Feet from Face of Cliff

THE Monocacy, Pa. quarry of John T. Dyer Co. has numerous unusual features. Because of these, this quarry was selected by the U. S. Bureau of Mines as one of the plants whose operating costs would be published in detail, as a bulletin in a series dealing with the non-metallic mineral industry. The preparation of this analysis was by Joseph A. Conway. It was released as Information Circular 6405, which was abstracted at length in the Feb. 25, 1931 issue of PIT AND QUARRY. The article, among other things, described the evolution of drilling and blasting practice in the Monocacy quarry, to improve efficiencies in breaking the refractory trap which locally occurs as dikes filling vertical fissures in the sedimentary measures and as sheets intruded among these measures. The trap contains faults that lie at a dip of about 45 deg., as well as a main series of joints that are nearly vertical.

Two practices are described in the previous publication—the ordinary deep churn drilling with the blasting of a line of holes, and the tunneling or gophering system in which, with a blast that was fired April 30, 1930, approximately 300,000 tons of rock was dislodged. The John T. Dyer officials have progressive ideas and the following description pertains to its last big blast, on March 24, 1931, which is believed to be the first of its kind ever attempted in this country.

The plan followed was conceived by William A. Kelly, recently deceased, who was, for many years, general superintendent of the quarry. It was executed under the supervision of du Pont technical men. Mr. Kelly had found that it was expensive to well-drill his quarry and, under certain conditions, almost impossible, since the face ran from 150 to 265 feet in height. After his first tunnel shot (at that time the largest ever fired in a trap-rock quarry) in the foot of the quarry wall, he conceived the idea of using tunnels to replace well-drill holes for the upper half. This procedure was not new, but the height of the face prohibited driving a tunnel straight in, half-way between the top and the bottom of this face, so he planned to sink a shaft in the rear to the proper depth and then to tunnel toward the face. It was his purpose, if the plan worked out successfully, to have the same shaft serve for three tunnel shots.

In following out this procedure, a shaft 6 ft. in diameter was sunk, 132 ft. from the face, and to a depth of 80 ft. A tunnel was then driven some 82 ft. forward, leaving a 50-ft. burden. From this, two lateral tunnels, parallel to the face, were constructed, the eastern lateral being 112 ft. and the western 107 ft. long.

As said, it was planned to utilize this shaft for three tunnel shots. The first of these shots is the one now described. A load of 25,000 lb. of du Pont Gelex A was placed in twelve units, spaced at the usual intervals in the lateral tunnels, the quantity in each unit being based on the rock tonnage the unit was meant to displace. The tunnel loading was only the usual method for similar jobs but, although it is the usual method to place stemming or tamping between the units, it was determined not to do so in this case. Instead, a 5-ft. reinforced concrete bulkhead was built at the intersection of the main tunnel and the lateral tunnels. There were pipe openings for the Cordeau and electric cables and for the introduction of water tamping. The water was pumped into a tank on the hill far in the rear and flowed thence by gravity into the shaft and tunnels. About 60,000 gallons were utilized.

A question in the minds of the men planning the job was as to whether or not there would be any leakage, and if so, what effect this leakage would have on the blast. It was discovered that there was only slight leakage which was remedied by turning in a slight additional quantity of water on the day of the blast. When the explosive charge was shot, with 30-ft. head of water, it functioned perfectly.

Another question was would or would not the explosive gas act on the water to injure the back tunnel and the shaft? One of the du Pont men stood within 150 feet of the shaft and the column of water rose some 60 feet above the mouth and then fell straight down without wetting the surface area for a distance more than 25 feet around. The shaft was not lodged from its position. From the face of the shot, it would appear that the angle of breakage in the rear of the lateral wall will permit the shooting of the next tunnel as planned in the future. The shot produced some 150,000 tons of stone as expected.

Marion Gravel Company Purchases Indiana Plant's Assets

Articles of incorporation have been filed with the secretary of state in Indianapolis by the Marion Gravel Co., having its principal place of business in Marion, Ind. The company recently purchased the assets of the Grant County Gravel & Sand Co. for $12,500. The company has an initial capital stock of 250 shares having a declared par value of $100 each. The incorporators were Frank L. Deer, Leon L. Deer, S. G. Cohen, L. A. Young and Walter Fudge, all of Franklin, Ia.

Slag car arriving at the track hopper at the Ensley plant.

Looking up at the head frame at Ensley. Skip car on incline.

Fire-Proof Structures Replace Original Plant Destroyed by Flames

Slag Producer Operates Two Crushing Units and Ready-Mixed-Concrete Plant

By MAT F. BEISBER

OF especial interest to the crushed-slag field is the recently-rebuilt Ensley plant of the Birmingham Slag Co., Birmingham, Ala. The Ensley plant is one of five owned by this company in Alabama from which shipments are made into all the southeastern states. During the night of Oct. 9, 1930, the tipple, which consisted of a skip-hoist head-frame and a complete screening plant, was destroyed by fire; only the primary crusher house and the hoist-and-office building remained.

Having been built during the war, timber construction was used because of the shortage of steel. The bins which form the base of the tipple were built of concrete; they were undamaged by the fire and now serve in the new plant built above them. The base of the headframe had been replaced with a steel structure and was not damaged enough by the fire to require replacement; the upper portion was of timber construction towering to the height of 144 ft. above the ground. As can be easily imagined, a structure of this height provided a spectacular blaze.

The Fairfield plant.

Reconstruction of the tipple began Jan. 1, 1931, steel and concrete being used throughout. With every modern means of materials handling and processing, the rebuilt plant became a model in this respect. Dust has no place in this slag operation. Every screen unit, and other mechanical unit producing dust in its operation is hooded and connected to an exhaust fan which sends the dust into a large cyclone collector. The plant has a daily output of 3,000 tons of finished materials, when operating on a 10-hr. schedule.

The Ensley No. 1 plant is located adjacent to the Tennessee Coal, Iron & R. R. Co. steel plant at Ensley, Ala., which is a suburb of Birmingham. Slag is brought from the six blast furnaces in ladle cars and is dumped into long pits on each side of a center track. A Marion No. 125 electric shovel with a 4-cu.yd. dipper excavates the slag from the pits and loads it into Sanford-Day 50-ton bottom-dump cars. There are three of these cars handled by one electric motor car, one car being always spotted at dump and one at shovel, while the other is being handled by the motor car. The motor car is equipped with two 75-hp. G.E. motors and air brakes. A third-rail track system extends throughout the slag pits to the track hopper. The latter, which fronts the primary crusher, is equipped to receive the bottom-dump cars. After a car is dumped, the dumping doors are automatically closed upon

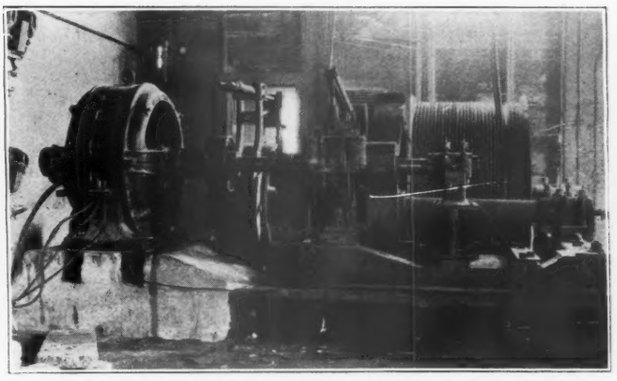
moving over a raised section of rail between the running rails.

From the hopper the slag passes to a Stephens-Adamson live-roll grizzly set for 2-in. openings. Here the fine slag is separated, passing directly to the skip bin. The oversize slag is chuted into a Symons 7-ft. cone crusher which is set for 2-in. breakage. From the crusher the slag is sent to the skip-loading bin. The Stephens-Adamson grizzly has 16-in. rolls and is driven by a 30-hp. Fairbanks-Morse motor; the Symons crusher is driven by a 200-hp. G.E. motor. This portion of the process takes place in the primary-crusher house. Arriving at the skip bin, the slag is handled through the newly-rebuilt tipple.

Because of the limited space available at the Ensley site, the plant utilizes a rather compact design using a tall steel structure with numerous levels. The tipple consists of a steep, double-track skip incline, a receiving bin on the top floor, and a series of vibrating screens located on levels beneath. This type of construction requires little floor space but demands considerable height in order to accommodate the series of vibrating screens. All steel work for the structure was furnished by the Ingalls Iron Works Co. In this particular design a noticeable feature is the complete gravity flow of the crushed slag from the top vibrating screen down through to the bins beneath.

After the materials reach the receiving bin in the head-frame by way of the skip-buckets no additional elevation is required, except in one case, that of a return-circuit elevator from a secondary crusher. The latter unit is used only when additional capacity is required for small-size slag. Under normal conditions there are no circulating loads, resulting in increased operating efficiency.

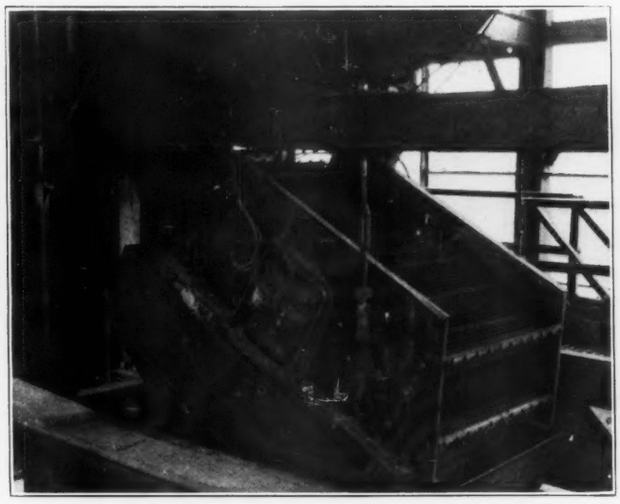
The skip-hoist incline, which is called the head-frame, is a tower-like structure having a vertical height of 141 ft. above the ground level. It carries skip-car tracks which extend an additional 57 ft. down to the level beneath the skip-bucket loading bin. This bin and the receiving bin located in the top of the head-frame hold 50 tons each. Each skip-bucket carries 7 tons of slag. As one bucket reaches the top of the head-frame, the other arrives at the loading bin. Thus the hoist raises but one loaded bucket at a time and simultaneously utilizes the gravity pull of the returning empty bucket. An Allis-Chalmers single-drum skip-hoist, powered by a 125-hp. motor, is located in a building opposite the loading side of the head-frame. The total travel of the buckets is 154 ft.



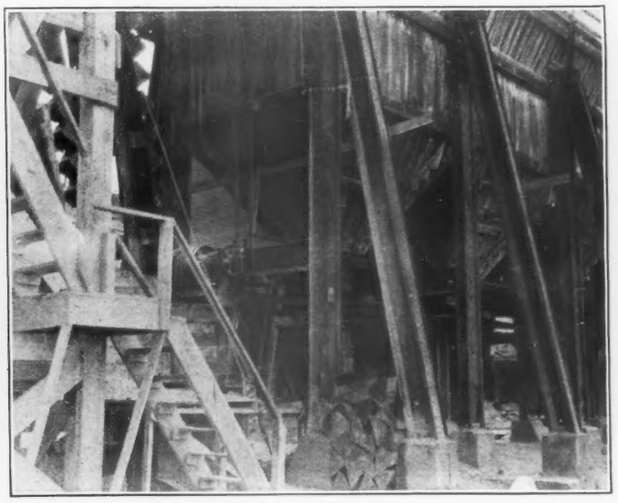
Motor and hoist at the Ensley plant.

With five protective features for the control of the skip-buckets, accidents with this equipment from mechanical failures become practically impossible. In addition to the regular service brake, an emergency brake is installed. Electrically-operated slack-cable switches, final-limit switches, and overspeed switches safeguard the movement of the skip-buckets so that any failure on the part of the hoist operator results in the automatic cut-off of power on the hoist motor and setting of the brakes.

As has been stated, the material is automatically dumped into a 50-ton receiving hopper located in the top of the head-frame. This hopper feeds a 36-in. belt conveyor 26 ft. long on pulley centers, and this, in turn, sends the material to the first vibrating screen. As the slag leaves the hopper it passes over a Buchanan rotating magnetic separator which removes tramp iron, casting it back to a chute. Fairfield conveyor equipment is used.



One of the double-deck vibrating screens at Ensley plant.



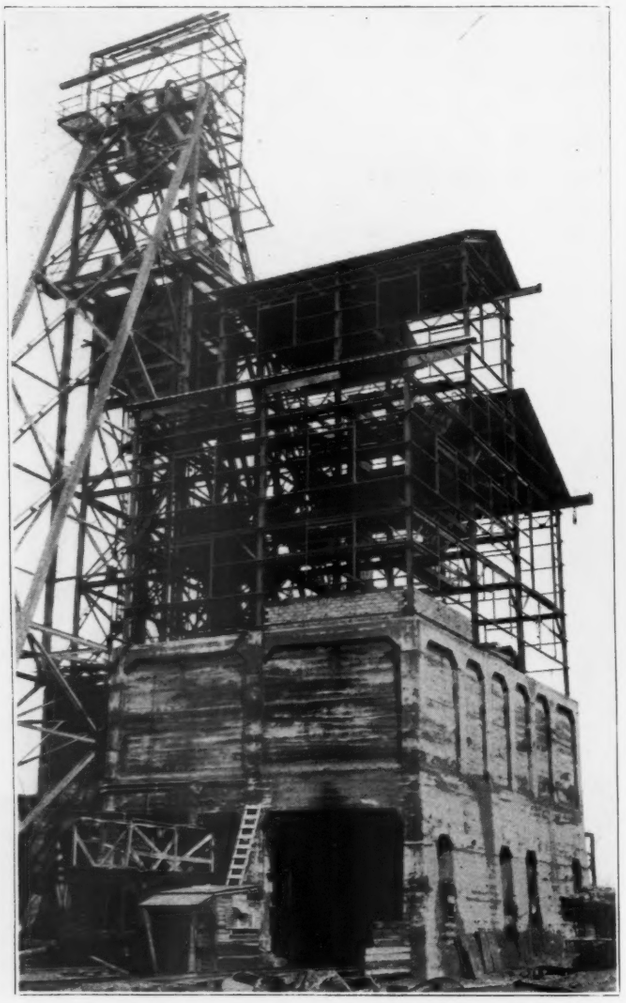
Bins for truck loading. Note elevators to the concrete plant.

A 20-hp. G.E. motor operates the conveyor and the magnetic separator.

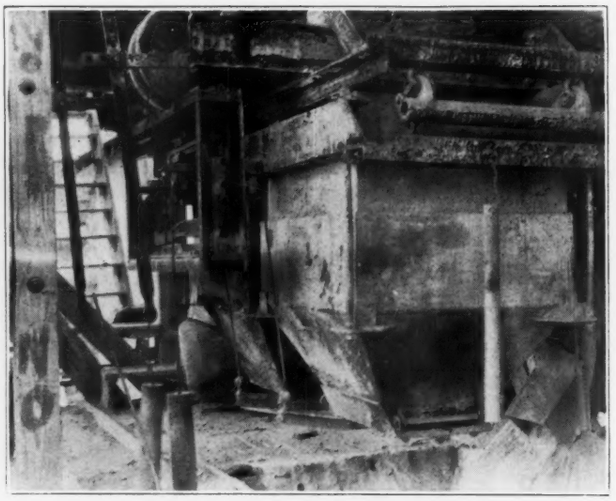
The screening process begins with the arrival of the material on the top deck of the first vibrating screen. At present there are four vibrating screens used for dry screening and one for washing the bin materials upon loading into the cars. Provision has been made for doubling the present screening capacity through the installation of a complete duplicate set of vibrating screens.

Following the flow of slag from the first vibrating screen, it will be noted that this unit, a Niagara 5-ft. by 10-ft. double-deck screen, acts as a primary separator. The top deck has a 1¼-in.-mesh wire-cloth screen, the lower deck a 1-in. wire cloth; 1¼-in. to 1-in. material is chuted to an Allis-Chalmers 2-deck screen. Slag 1¼ in. to 1 in. in size is sent direct to a bin. Minus 1-in. material is chuted to two Traylor 2-deck vibrating screens.

The Allis-Chalmers unit has two 3-ft. by 8-ft. decks, the top having a 2½-in.-mesh wire-cloth screen, the bottom a 1⅝-in.-mesh wire-cloth screen. All oversize material from the top deck is sent direct to a Symons 4-ft. cone crusher. Material 1⅝ in. to 2½ in. in size can be sent either to the cone crusher or to a bin as desired.



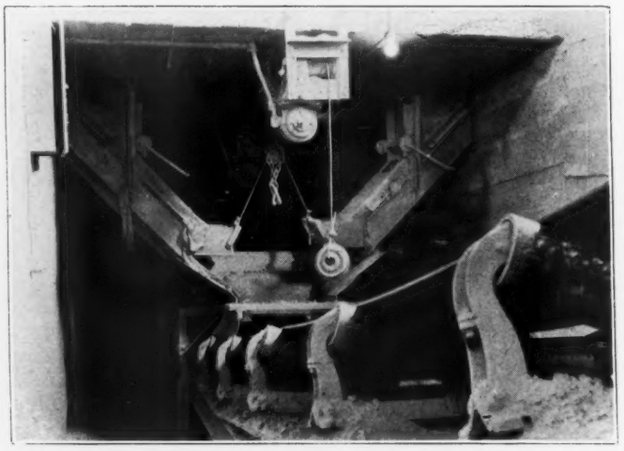
The new steel and concrete plant at Ensley which replaces the one destroyed by fire.



View of the aggregate weighing hopper.

An 18-in. Link-Belt bucket elevator returns the crushed slag to the conveyor which feeds the top Niagara vibrating screen. This elevator has a pulley-center distance of 54 ft. and is driven by a 20-hp. G.E. motor. The Symons cone crusher is driven by a 100-hp. G.E. motor.

All minus 1-in. slag from the Niagara unit is handled by two Traylor 4-ft. by 8-ft. screens in series. The first unit has a ⅞-in.-mesh wire-cloth screen on the top deck, and ½-in.-mesh cloth on the bottom deck. The second unit has a ¼-in.-mesh top deck and a ⅛-in.-mesh bottom deck. Both vibrating screens, being in series, produce the entire classifications of crushed slag below 1-in. size, which



Tunnel conveyor showing remote-control mechanism for the gates.

includes five sizes of materials. Ludlow-Saylor and Tyler screen cloth are employed optionally on all vibrating screens.

To rid the screen-house of the objectionable dust common to any dry-screening process, every unit is hooded on both its top and bottom, the bottom hood being, of course, a chute which sends the material to its destination. All the hoods are connected by ducts to an American Blower Co. 44-in. Sirocco exhaust fan which is driven by a 75-hp. G.E. motor.

The fan sends the dust into a Sirocco cyclone-type dust collector which precipitates it into a closed bin beneath. All the storage bins for the various sizes of slag have closed tops to prevent the spread of dust.

For loading and handling car shipments of slag a concrete bin structure, which forms the base of the tipple, is used. This structure has 11 bins, each with a capacity of 75 tons. Normally but eight of the bins are in use, providing storage capacity for 600 tons of crushed slag. The bins are built on heavy concrete piers which allow two side-tracks to enter beneath them. During the reconstruction

Rear view of the Ensley ready-mixed concrete plant.

period the upper portions of the bins were built and their height increased by several courses of slag-concrete tile to increase their storage capacity.

Special provision has been made to load a washed, dust-free product into the cars. A conveyor, with access to various dumping gates beneath, receives any desired size or proportion of sizes from the bins and sends them to a Niagara 5-ft. by 8-ft. single-deck vibrating screen which has a ¼-in.-mesh wire-cloth screen. A heavy spray of water rinses off all dust particles, and the washed slag then falls into the car beneath, which is kept in motion by an electric car spotter to provide even loading or distribution of the graded slag in the car and prevent

Ground view of the concrete plant.

Cone crusher for secondary reduction at the Ensley plant.

segregation, the slag being actually loaded in the car in thick layers.

One of the special features of construction in this plant is the use of underground conduit wiring from building to building, insuring permanent and safe power transmission. All stairways and walkways through the plant are adequately safeguarded with railings; the steps are made of concrete-filled channel sections.

In the crusher house a P & H 5-ton monorail crane handles the removal and loading of tramp-iron slag into railroad cars. A side-track extends direct to the crusher-house for this purpose. The crane also serves to handle crusher parts and other crusher-house heavy equipment.

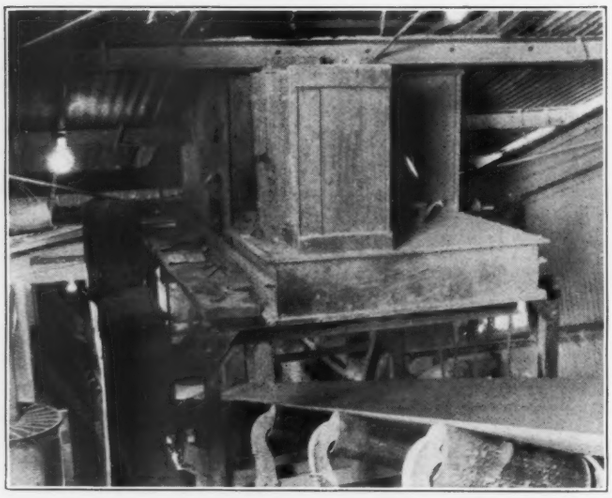
Ensley Ready-Mixed Concrete Co.

Retail sales of crushed and screened slag as well as ready-mixed concrete are also made from Ensley Plant No. 1. The truck-loading bins and ready-mixed concrete plant are located a short distance from the crushing and screening operations.

Materials for the loading bins are brought from the slag plant in car-load quantities. The cars arrive on a high fill, the extension of which is a steel structure with wooden bins built between the steel

columns. There are ten bins in the structure, each being 15 ft. wide and having a capacity of 50 tons. Truck deliveries are made direct from these bins, loading any of the seven sizes of slag aggregates or either of the two sizes of sand carried in them.

The concrete-mixing plant is built at the end of



Weight-proportioning installation on loading conveyor. Fairfield plant.

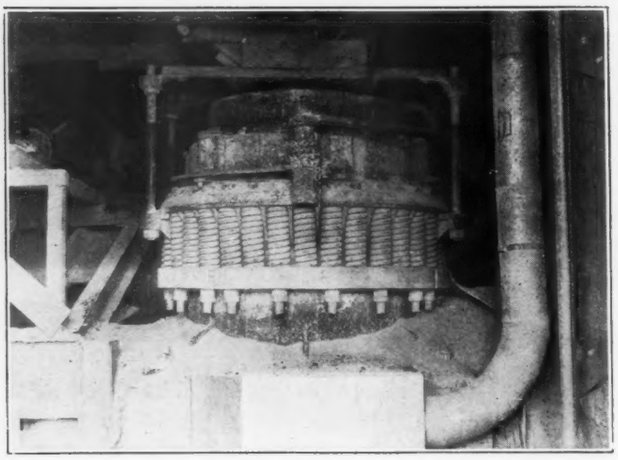
the bin structure. It receives its aggregates by means of a 42-in. belt conveyor which moves material horizontally beneath six of the bins, and a bucket-elevator which discharges it into a 4-compartment bin above the weighing batchers. The conveyor is approximately 90 ft. long on pulley centers, and has access to individual dumping gates built on the sides of the bins. In the bin above the weighing batchers the four compartments provide a combined storage capacity for 75 cu.yd. of aggregates, which include two sizes of sand and two sizes of aggregates.

In the Birmingham district concrete specifications employ either Portland cement or puzzolan cement or mixtures of both. "Magnolia," a puzzolan cement manufactured by the Southern Cement Co. at Birmingham, Ala., is quite commonly used where a non-staining cement is required. It has a characteristic slow-setting property, and is quite often used for pavement bases. With two kinds of cement in use, facilities for storing, weighing and handling of the two varieties must be provided. At this plant three receiving bins are in use. Two of them are built behind the aggregate-bin trestle. Each of the bins has a capacity of 350 bbl. of cement. Separate 8-in. screw conveyors connect them to an elevator, which sends the cement to a short screw conveyor leading to a 2-compartment hopper above the cement-weighing hopper. A third cement-storage bin, with a capacity of 1,000 bbl., has recently been built to the left of the mixing plant. This bin receives bulk cement from cars brought to it on the adjacent high fill, which happens to be at a height that allows direct unloading to the bin by a 20-ft., 12-in. screw conveyor. This bin has two compartments for storing both types of cement. It discharges direct to the boot of the same elevator used for the other two bins.

The weighing batchers for the aggregates consist of two units, each equipped with Buffalo Scale Co. beam scales. One handles sand, the other crushed slag; both discharge to a pants-leg chute which sends the weighed materials to either of the two mixers. Both hoppers have capacities sufficient for a 1-cu.yd. mix. Cement is weighed in a specially built hopper mounted on a standard platform scale. This batcher discharges direct to the same pants-leg chute used for the aggregates. Water measuring is done by means of two volumetrically calibrated tanks.

Two T. L. Smith 1-cu.yd. tilting-type mixers han-

Slag pile at the Fairfield plant.



Secondary cone crusher at the Fairfield plant.

dle the mixing part of the concrete production. They are mounted side by side and discharge into trucks below. Both are driven by individual 50-hp. G.E. motors. The mixing time is measured by a Koehring Batchmeter installed on each mixer.

Open bath-tub bodies are used in the delivery of the ready-mixed concrete. All the hauling is done by rented trucks. With both mixers in operation, from 400 to 500 cu.yd. of concrete can be mixed and delivered in a 10-hr. day.

Fairfield Plant, Birmingham Slag Co.

The second major operation of the Birmingham Slag Co. in the Birmingham district is its Fairfield plant, located at Fairfield, Ala., another suburb of Birmingham. This plant, although slightly smaller in productive capacity than the Ensley operation, is

spread over a larger area on a much larger site. Although producing similar-sized materials, the Fairfield operation offers an interesting contrast in design to its sister plant at Ensley. During the period of shutdown of the Ensley plant following its destruction by fire, the Fairfield plant was called upon to supply an exceptionally heavy demand for crushed slag. It has a 10-hr. capacity of 2,250 tons of finished materials.

One of the chief advantages of the Fairfield operation lies in the fact that the plant and slag-pit reclamation were laid out to the best advantage and not to suit an already-existing condition. Thus we find an efficiently-planned system of handling materials from pit to car.

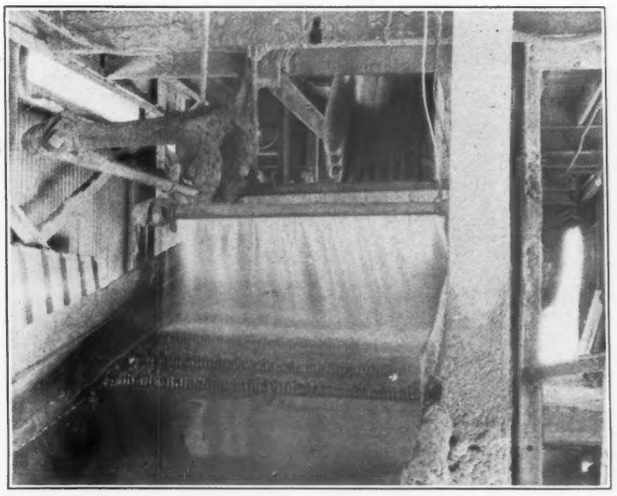
The slag pit is oval-shaped, being surrounded by

Slag cars arriving at the Fairfield track hopper.

a 4,500-ft. third-rail track system used by the quarry cars. Slag is brought from the Tennessee Coal, Iron & Railroad Co. Westfield plant and dumped to either side of a high fill which extends the full length of the pit along its center. Approximately 50,000 cu.yd. of slag can be stored on each side of the pit. The third-rail track system which surrounds the pit must necessarily cross the center railroad track. This is done by passing the third-rail system underneath it through a tunnel.

A Marion No. 125 electric shovel with a 4-cu.yd. dipper excavates the slag from the pit and dumps into trains of Sanford-Day 45-cu.yd.-capacity bottom-dump cars. There are two of these cars and a third which is equipped with its own motors and a control cab. For service with the slag cars and general yard duty, two G.E. electric locomotives are in use. Power for the third-rail system is converted from alternating current to direct current by means of a motor-generator set located in the power-distribution house. The a.-c. motor is a 255-hp. synchronous unit direct-connected to a 150-kw. d.-c. generator, producing a line voltage in the third rail of 250 v.

The loop end of the third-rail track system passes over a track hopper at the plant. Thus a train of slag arrives at the hopper, is dumped, and continues on its way around the oval to return to the shovel. This system eliminates switching and minimizes delays both in unloading and in loading at the shovel. In the track hopper is a rail grizzly, with the rails spaced on 14-in. centers, to retain oversize



Washing screen in the loading building. Fairfield plant.

pieces and large tramp iron. Passing the grizzly, the slag is chuted to a Stephens-Adamson 60-in. live-roll grizzly driven by a 25-hp. G.E. motor through a James speed reducer. Two-inch openings in the live-roll grizzly permit the "fines" to pass direct to the plant elevator; the oversize slag falls into the crushing chamber of a Symons 7-ft. cone crusher driven by a 200-hp. G.E. motor. Attendants at the grizzly and crusher are constantly on the watch for pieces of tramp iron as they pass over the grizzly.

All crushed slag and the "fines" are chuted together to a Stephens-Adamson 60-in. bucket-elevator which connects the screening plant with the crusher-house. Arriving at the screening plant, the slag is discharged on a 60-in. belt conveyor, 11 ft.

Live-roll grizzly feeding the cone crusher.

long on pulley centers, the head pulley of which is a Dings magnetic separator. As the slag passes over the separator the tramp iron is cast below into a chute which leads to a pile outside the building. The slag is discharged to the first vibrating screen.

As in the Ensley plant, vibrating screens are used exclusively for the screening process. Each unit is

Hoist equipment for the Fairfield plant derrick.

Tramp iron removed by the magnetic separator.

hooded and the dust is withdrawn by means of a No. 60B Sirocco exhaust fan which is driven by a 75-hp. G.E. motor. A Sirocco dust-collector receives the dust and precipitates it to a bin beneath.

In the screening process, five vibrating units are used for dry classification of the crushed slag, and two units for further classification of the screenings. The first screen, a Niagara 6-ft. by 8-ft. unit, has two decks, the top deck with a 2¼-in.-mesh screen and the bottom deck with a 1⅝-in.-mesh screen. "Rejects" from the 2¼-in. screen deck are sent direct to a secondary Symons 4-ft. cone crusher which is set for particular size requirements and discharges to a bin beneath. It is driven by a 100-hp. G.E. motor. The plus 1⅝-in. to 2¼-in. material is sent direct to a bin, and the "throughs" pass to the top decks of the first of two pairs of vibrating screen units.

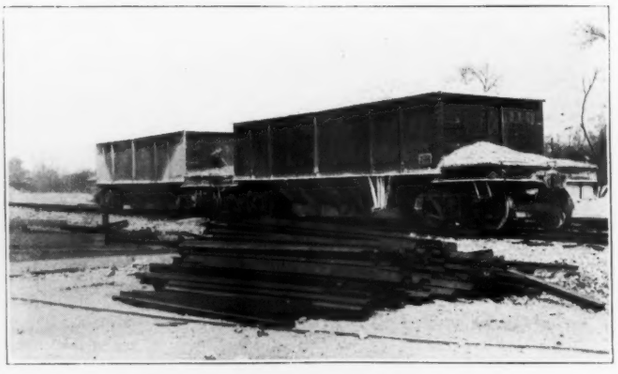
Five sizes of crushed slag, including 1¼-in. to 1⅝-in., ¾-in. to 1¼-in., ½-in. to ¾-in., ¼-in. to ½-in., and minus ¼-in. screenings, are made on the two pairs of Traylor 4-ft. by 8-ft. double-deck vibrating screens, which are arranged one pair above the other. All the classified materials are chuted into bins beneath.

An elevator in the screenings bin sends this material up to another pair of Traylor 4-ft. by 8-ft. double-deck screens, which separate them into three sizes. No. 8 mesh screens are used on the top decks, and .0114-in. mesh screens on the bottom decks. The elevator used in this process is a Link-Belt unit, 65 ft. high on vertical centers and having 8-in. buckets.

There are twelve bins in use at the Fairfield plant, two of which are 50-ton capacity tanks for slag dust. Ten bins, each with a capacity of two car-loads, are used entirely for car-load shipments. Beneath these ten bins a tunnel-conveyor system has been installed to send the bin materials to the washing-and-loading building.

One of the features of the plant is the remote-control system of starting and stopping the flow of materials from any bin dumping chute. Each bin has an adjustable rack-and-pinion type of gate which discharges into a chute to the belt conveyor in the tunnel. The adjustment of the gate determines the quantity flow of materials through it. The end of the chute, however, has a short section hinged to it and connected by a wire rope to a small motor-driven winch mounted on the tunnel ceiling. The Weightometer operator in the washing-and-loading building has a switchboard, one switch for each of the winch motors which control the positions of the discharge-chute ends. At a throw of the switch the chute end is raised or lowered, thus allowing the operator to obtain any size material on the belt conveyor or any proportion of sizes desired. The belt conveyor has a Goodyear 48-in. belt, 185 ft. long, on vertical centers, part of which is in the tunnel and the remainder on an 18-deg. slope leading to the washing screens. Stephens-Adamson equipment is used in the con-

Huge electric shovel used at the Fairfield operations.



Steel dump cars in use at the slag pits.

veyor, which is driven by a 40-hp. G.E. motor through a Falk speed reducer. On the inclined portion of the conveyor a Merrick Weightometer is installed for checking the delivery weights.

For the removal of dust, the delivered materials from the 48-in. conveyor are divided into two portions, each of which passes to a Stephens-Adamson shaker screen. These screens are 54 in. wide and 8 ft. long, and each is equipped with two spray pipes. The washed slag is chuted direct to the cars beneath, over a wide chute which can be raised or lowered according to the height of the car being loaded. This arrangement, together with the moving of the car back and forth while being loaded, by a car spotter provides the best known method of loading graded aggregates in cars without segregation which was so common a few years ago. The wash water is flumed to a 15-ft. by 30-ft. by 12-ft. (deep) settling pond. The overflow from the pond furnishes water to a second pond, which is used for fresh-water storage. An Allis-Chalmers 8-in. by 6-in. centrifugal pump delivers the water to the spray jets.

An American Hoist & Derrick Co. derrick is located at a point accessible both for loading tramp iron into railroad cars and for handling crusher parts and other heavy equipment in the crusher-house.

Each of the Birmingham Slag Co. plants is under the supervision of a superintendent. W. D. Bennett is in charge of the Ensley plant, S. W. Smith of the Ready-Mixed Concrete Plant and D. T. Mann of the Fairfield plant. The officials of the company include C. E. Ireland, president; C. B. Ireland, vice-president; G. C. McCullough, vice-president and general manager; N. L. Smith, treasurer, and C. A. Barinowski, sales manager. J. C. Friddle is general superintendent.

Statistics Show Gypsum Production at High Level in 1930

The cylinder-crushing strength which is required for the concrete used in pavement bases in cities varies from 1,000 lb. per sq. in. to 4,000 lb. per sq. in. at 28 days, according to Charles E. Reppert, city engineer of Pittsburgh, in a recent survey of paving practices in twenty large cities in the United States made by the American Road Builders' Assn.

Slightly more than one-third of the cities require that the concrete shall show a crushing strength of not less than some figure between 2,000 and 3,000 lb. per sq. in., says Mr. Reppert. Four cities permit the strength to be less than 2,000 lb. per sq. in., while many have no strength requirements to be met.

One of the requirements of the concrete used in bases, where the temperature of the base gets well below the freezing-point of water, is that it shall be so dense that the water in the pores will not freeze and disrupt the materials forming the concrete. Concrete having a crushing strength of between 2,000 and 3,000 lb. per sq. in. evidently satisfies this condition, as the cities having the colder weather require the concrete to be within this range, while the lower strengths of the concrete are used in those cities having a warm climate.

The maximum economy in the building of a concrete foundation can be secured only through the accurate proportioning of the aggregates, cement and water. Only two of the survey cities do not definitely require the accurate proportioning of the materials.

Only seven of the survey cities do not require that the concrete-mixer be equipped with a timing device. These cities may have exceptionally dependable contractors so that mechanical devices are not necessary to insure that the concrete is always thoroughly mixed. Timing devices, however, seem to be considered more certain.

A mixing time of from 1 to 1½ min. is the most generally used. No city reported the requirement of less than 1 min. Only three cities require over 1½ min. The longer mixing time makes the concrete more workable and allows the use of less water to produce cement that can be easily placed and without the separation of the water. It has been found that a long mixing time is an advantage in the preparing of central-mixed concrete, as it makes the concrete less likely to separate during its transporting.

The consistency of the base concrete when it is placed is considerably stiffer than that used for concrete-building work. The required slump of a standard cone, in almost every case, comes between 1 and 3 in. Well-proportioned and thoroughly-mixed concrete, having almost no slump, can be easily placed in a concrete base with a little light tamping.

The surveyed cities seem to be about equally divided on the question of using, for pavement bases, a concrete which runs into place and one that requires some tamping to place it properly.

The Six-Hour Day

(Continued from page 23)

4 hours' duration, have been adopted with a view to holding organization intact and spreading the burden of reduced income over the entire working force. If, at the same time, readjustments have been made in order to utilize the gains that result from the shorter day, it is quite probable, in some cases, that the shorter day will be carried over into the period of more active production that is to come. The present is certainly a favorable period for experimenting with a principle that others, through experience, have already found profitable. A careful check on individual output, conducted under circumstances which do not make the task a great burden, should reveal astonishing facts to those who have not yet learned the advantages of shorter days and greater output. The test of fitness to survive in the increasingly difficult competitive situation in which the nonmetallic-mineral industries find themselves will turn on real efficiency, and the shorter day, properly applied, is one of the surest ways in which to approach that efficiency and to reduce production costs.

A string of loaded cars with the Buda plant in the distance.

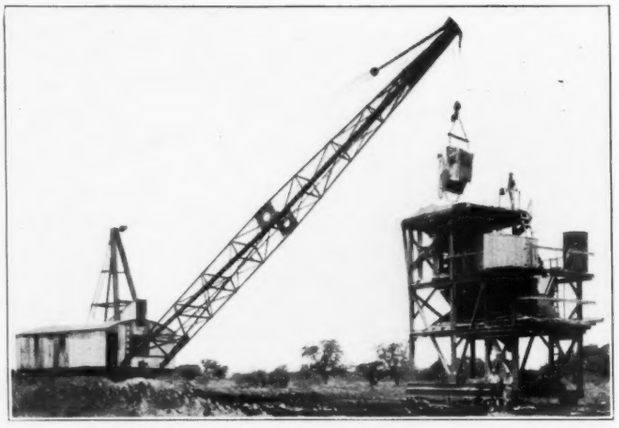
Houston Gravel-Plant Combine Has Daily Capacity of 300 Car-Loads

Operations Make Extensive Use of Huge Drag-lines for Excavating and Loading

By T. J. BEESLEY
Production Engineer, Texas Constr. Material Co.

THE Texas Construction Material Co., whose main offices are in the Petroleum Bldg., Houston, Texas., was formed in May, 1929, by the consolidation of four gravel companies: Gemmer & Tanner, Inc., with plants at Gemmer & Tanner Spur (near Columbus) and Eagle Lake, Tex.; Columbus Gravel Co., with plants near Alleyton, Tex.; Romayor Gravel Co., with a plant at Romayor, Tex.; and the Colorado County Gravel Co., with a plant near Glidden, Tex. Since the consolidation, the company has bought and enlarged the Buda gravel pit at Buda, near Austin, Tex.

The personnel of this company comprises: W. H. Gemmer, president; E. A. Fletcher, vice-president; W. E. Sampson, vice-president and general manager; E. P. Gemmer, sales manager; T. J. Beesley, production engineer; and L. S. Lawrence, assistant production engineer. The directors of the company include W. H. Gemmer, Houston; E. A. Fletcher and T. S. Reed, Beaumont; J. J. Everett and L. T. Everett, Alleyton; L. S. Lawrence, Columbus; and W. E. Sampson, E. P. Gemmer and T. J. Beesley, Houston; all of Texas.



Drag-line, crushing and screening equipment at the Buda road-gravel plant.

Loading pit-run material at the Columbus operations.

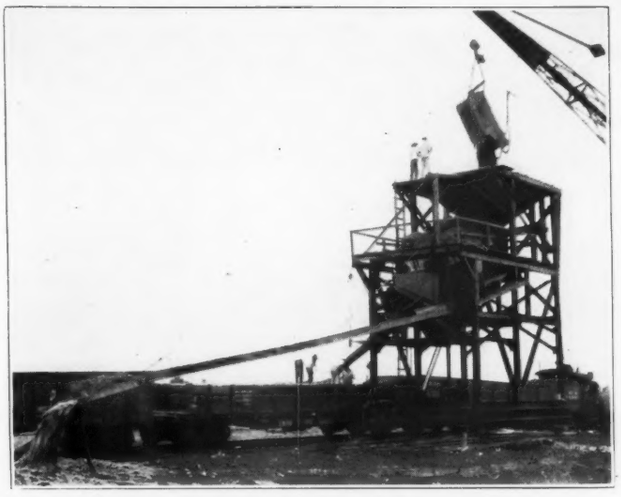
The combined capacity of all plants is 300 car-loads per day. These plants, being located in various parts of the state and possessing different types of deposit, have several methods of operation. Therefore, each plant will be discussed separately with some detail.

The company's principal shop is at the Gemmer & Tanner plant. All work is done at this shop, except small running repairs, each plant having the necessary equipment for such work. In the main shop are built the large drag-lines, screening and washing plants, and many kinds of equipment used in the operation of the various plants. All locomotives are sent to this shop when they require gen-

eral overhauling. There is enough general repair and building of new equipment to keep 15 to 20 men busy in this shop.

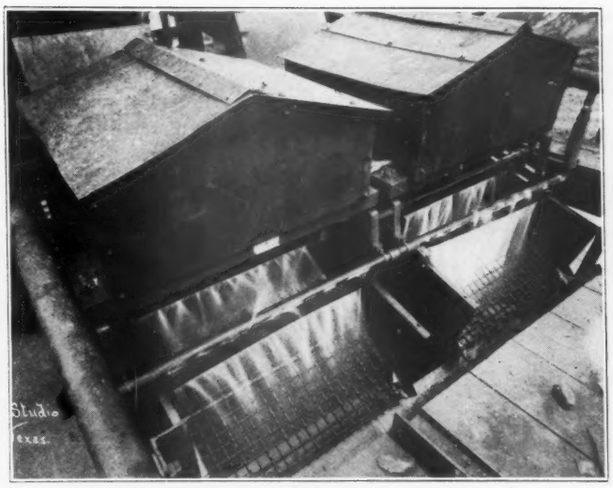
Three of the plants—the Gemmer & Tanner plant, the Columbus Gravel Co. plant, and the Colorado County plant—are operated by the use of portable washing plants and 3- to 4-cu.yd. draglines.

Each of the plants is served with two tracks, one under the plant and one at the side. When necessary, a third track can be used but, as there are seldom more than two sizes of material being loaded at the same time, the use of the third track has been discontinued because of the additional



Vibrating screens are used at the Rutta plant.

time and expense of shifting this third track when moving over a new cut. These plants and draglines operate along cuts that are 150 ft. wide and run the length of the deposit. This practice enables a long period of operation, one cut often lasting six months and more. When the cut is exhausted, the track is shifted over for another 150-ft. cut, and the same operation is repeated. It requires about 4 days to shift tracks and machines. Since seven



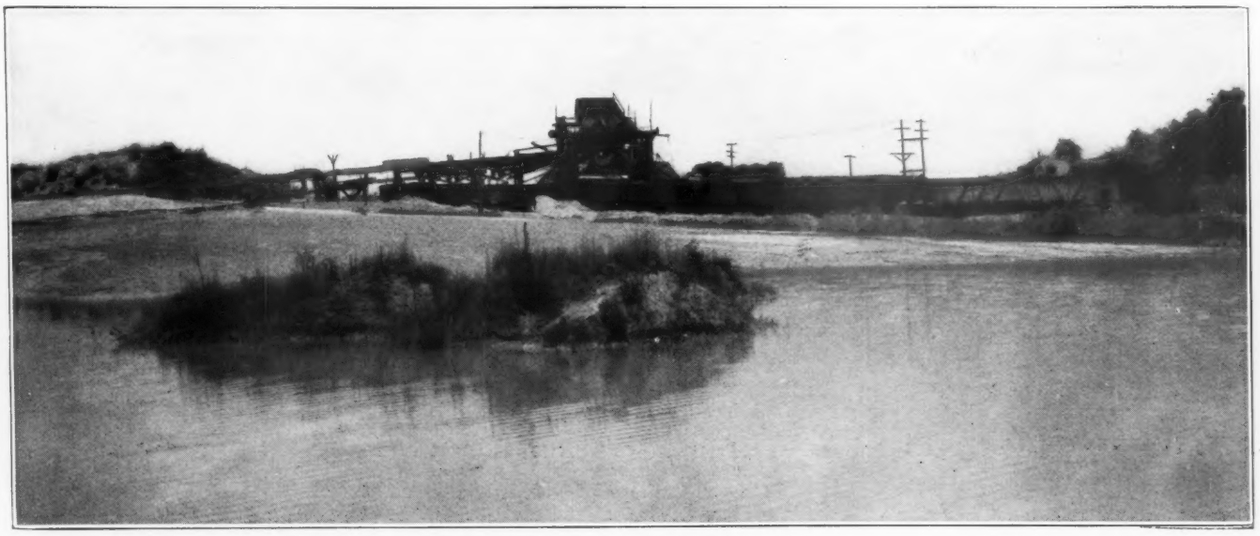
Two of the vibrating screens in the Rutta plant.

of these portable units are in service, there is never more than one being shifted at a time, and the delay in production is negligible.

Three of these portable washing plants, two at Gemmer & Tanner and one at Burt Spur (Glidden), have single rotary screens with a variation of screen sizes. The following sizes of gravel are produced: ¼-in. to 2½-in; ¼-in. to 2-in.; ¼-in. to 1½-in.; and ¼in. to ¾in. Sand can also be loaded at any plant when necessary.

One of the portable plants, the Rutta plant (an extension from the Gemmer & Tanner plant), is equipped with two 4-ft. by 8-ft. triple-deck Plat-O vibrator screens manufactured by the Deister Machine Co. at Fort Wayne, Ind. This plant has a much larger capacity than any of the rotary-screen plants, and is the most recently constructed. Since quick changes of screen sizes are possible on this unit, it is comparatively easy to produce any size gravel.

The two portable plants at Laban Spur which are part of the Columbus Gravel Co.'s plant, have double rotary screens on each plant, giving them

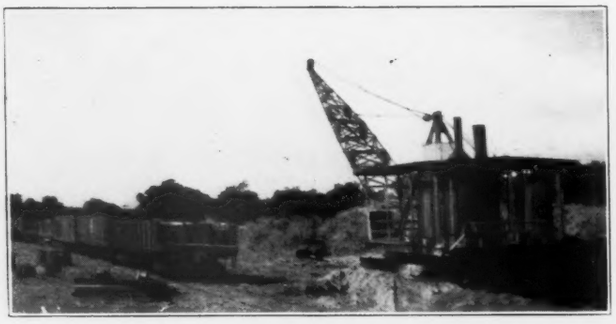


The Eagle Lake plant. The two huge revolving screens are visible at the top of the plant.

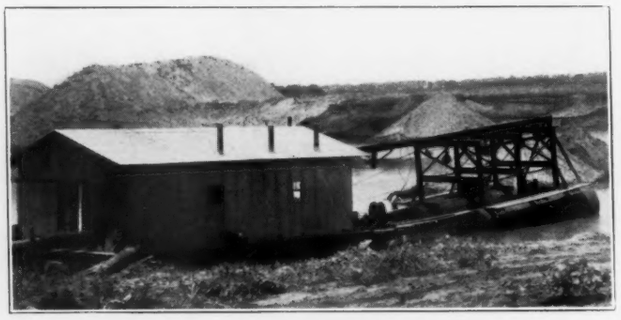
greater capacity and a larger variety of sizes than the single-screen units. About 5 to 10 per cent. of the gravel in this deposit is larger than a 2½-in. round opening, and portable crushers have been installed. The crushers selected for this work are of the single-roll type, built by the McLanahan & Stone Corp. of Hollidaysburg, Pa. Each crusher and the electric motor for driving it are mounted on 20-in. I-beams about 20 ft. long, placed on standard railroad-car trucks. One wheel of each axle of this machine runs on the plant track next the cut, and the other wheel on another extra rail laid along the bank of the cut. The "oversize" from the screen comes down a chute to the crusher hopper and is crushed to the desired size. It is then discharged down the bank of the cut, is picked up by the drag-line car and returned to the plant, where it again goes through the screens to be sized and mixed with the other gravel before going to the cars. By this method the oversize material is reclaimed with very little additional cost.

At the Hester pit of the Gemmer & Tanner plant near Columbus and at the Talton pit of the Columbus Gravel Co.'s plant near Alleyton there are deposits of gravel with clay binders. These deposits have very little overburden and about 20 ft. of clay gravel. The operation in these deposits is simple. One track along the cut is used, and the gravel is loaded into cars as it comes from the pit. About 5 per cent. of this material is larger than a 3-in. ring and is used principally for base courses on gravel roads.

The Eagle Lake pit is located on the G. C. & S. F. Ry. about two miles from Eagle Lake with about that mileage of railroad track to serve this plant. One 65-ton Baldwin Mogul-type locomotive does the switching at the plant and hauls the loads out to Lakeside, where the G. C. & S. F. Ry. receives them. This deposit of gravel is from 50 to 60 ft. thick and is covered with 3 to 9 ft. of overburden, mostly clay and sand. This overburden is stripped with a 3-cu.yd. drag-line, built by the company in its own shop at the Gemmer & Tanner plant. This is followed by a dredge equipped with a 15-in. Amsco heavy-duty gravel pump, the sand and gravel being pumped direct to the washing plant. This pump is driven by a 500-hp. Allis-Chalmers variable-speed motor. This plant is on wheels and can be moved from one location to another in a very short time.

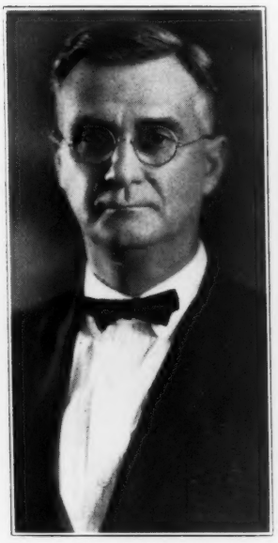


Steam drag-line loading at Talton Spur.

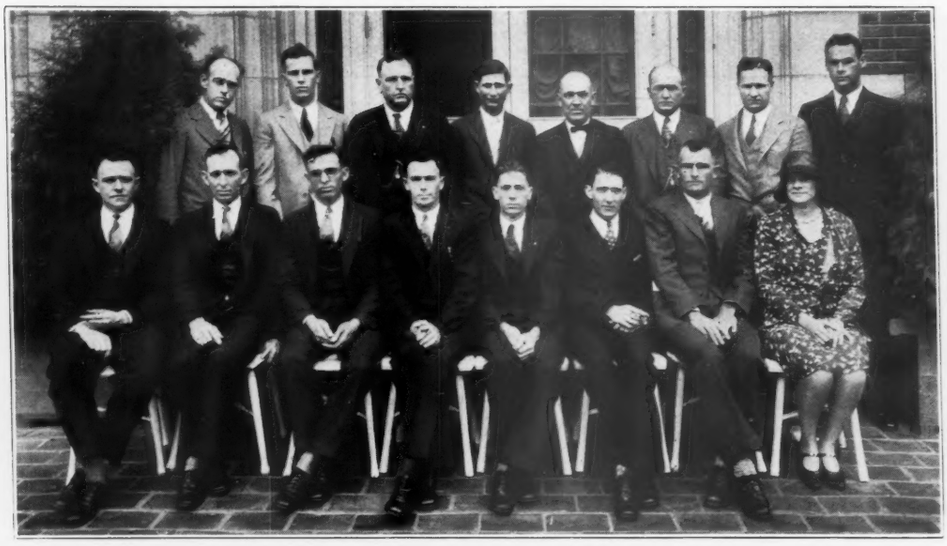


Dredge at the Eagle Lake plant.

The drag-line at the Romayor plant. The tipple is seen at the right.



W. H. Gemmer, president.



A group of plant executives at one of the monthly luncheons at a Houston hotel.

The plant has double rotary screens, about 18 ft. long, with three decks each, enabling the operator to produce gravel sized as follows: ¼-in. to 2½-in.; ¼-in. to 2-in; ¼-in. to ¾-in. Sand hoppers are arranged so as to make two sands: ¼-in. to "fines" and ⅛-in. to "fines." The plant is served with three gravel tracks and two sand tracks. At places in the deposit there are layers of clay in the gravel and, to overcome this, the gravel from the screens runs through a No. 60 Perfect classifier, built by the Perfect Classifier Co. of Nashville, Tenn.

A 1-cu.yd. Northwest crawler-type crane is used to store gravel in dull seasons and to load it back to cars during rush periods. This plant, at present, is producing ballast for the G. C. & S. F. Ry., besides shipping 30 to 50 car-loads of ballast and 10 to 15 car-loads of sand per day. The concrete gravel that is shipped from this plant, while working on the ballast contract, is taken from storage.

The Romayor plant is located on the Beaumont division of the G. C. & S. F. Ry., near the Trinity River at Romayor, Tex. The deposit lies along an old bed of the river, about three-quarters of a mile from the present river location. It is a very hard quartz gravel ranging in size from ¼-in. to 1½-in. with 95 per cent. of the gravel passing a 1½-in. ring. The sand is well-graded concrete material, very sharp, and an excellent traction sand. A large trade has been developed on this for both traction and mortar sand. To produce these sands, the ¼-in. (or concrete) sand is passed over a ⅛-in.-mesh screen to remove the small pebbles.

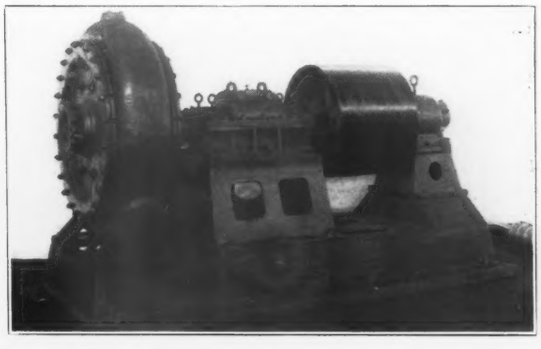
The overburden ranges from 3 to 9 feet in thickness and consists of sand, loam and clay. The gravel varies in thickness from 14 to 20 ft.

This plant is in an isolated location, so the company has built houses for its employees. These houses are furnished with electric lights, sewerage, and running artesian water. The gravel is produced with two dredges equipped with 10-in. Amsco heavy-duty gravel pumps. The gravel and sand are pumped to a water-box on a semi-portable washing plant. This water-box baffles and kills the force of water, sand and gravel. The material and the water runs from the box over a spreader onto a Niagara double-deck counterflow screen. A 3-cu.-yd. drag-line, with a 100-ft. boom, used to strip the overburden, was built in the company's main shop at the Gemmer & Tanner plant. This drag-line is powered with a 125-hp. General Electric 220-v. motor. The electric cable enters through the center pin and is connected to the machine by a central revolving switch.

A 1¼-cu.yd. P. & H. shovel is used for storage and other work about the pit.

The Buda plant is operated in the same manner

A 1¼-cu. yd. excavator operating at the Romayor plant.



The 10-in. belt-driven dredge pump before being installed.

as the portable washing plants at the other pits. The plant is moved along the 150-ft. cut and, as only one class or size of material is loaded at a time, the double track is not necessary. One track under the plant is used. The drag-line, which has a 100-ft. boom and handles a 3-cu.yd. bucket, digs the gravel and places it in the 20-cu.yd. hopper on the plant, whence the material is fed into a revolving screen by a Weller Manufacturing Co. self-contained apron feeder. The screen has 1½-in. round holes through which about 85 per cent. of the material passes and is fed to a 24-in. belt conveyor which runs under the screen hopper and crusher chute. The 15 per cent. of the material larger than 1½-in. falls from the screen into an 18-in. by 30-in. McLanahan & Stone Corp. single-roll crusher in

The drag-line at the Eagle Lake deposit.

which it is reduced to proper size, and is then fed into the belt conveyor which mixes the material from the crusher with that passing through the screen *en route* to the cars. This conveyor belt is about 16 ft. long between centers and runs under the screen hopper and the crusher chute. The proper mixing of screened and crushed material is the principal function of this belt conveyor.

This deposit is a limestone gravel, of which 65 to 75 per cent. is retained on a No. 4 standard test screen. The other 25 to 35 per cent. is lime, sand and a clay which has excellent binding qualities. About 15 per cent. of the gravel is larger than 1½-in., ranging from 1½-in. to 6-in. or 7-in. This "oversize" is crushed and mixed back before loading. Due to the cementing qualities of the binder and the high percentage of road-metal in this gravel, it has been an excellent and very popular material for gravel roads and streets.

This plant has a capacity of 30 car-loads per 10-hour day.

Once each month the heads of the Texas Construction Material Company's various departments and scattered plant executives get together at a hotel for luncheon and a discussion of production, sales, and other problems. Participants in these gatherings include all persons in responsible positions, and the continued recurrence of the meetings attests their worth to the company.

Rules of Safety in Quarrying

(*Continued from page 34*)

observance it should not be a particularly hazardous place in which to work.

Bins

In speaking of bin hazards we generally think of slides in cement storage bins, but accidents are not limited to them alone. Fatalities have occurred in some bins for the storage of stone. In still others there have been some very narrow escapes. Experience is a good, but often cruel, teacher.

Accidents in stone storage bins are inexcusable. Too often we have the accident before we discover the cause and look for the remedy. We give positive instructions that no employee is to go into a bin without an attendant, or if he is alone that he must wear a belt. But some day we have an accident and must go through the gruesome and fatiguing task of digging out an employee from a cave-in by removing handful after handful of stone with the greatest care. Perhaps he is not discovered until an employee in the tunnel finds a pair of feet in the chute. The alarm is given, machinery is stopped, and a few rescuers risk their lives beneath a small mountain of stones. Every care is exercised to keep the stone from moving, because movement of a few rolling stones might be the cause of tons following.

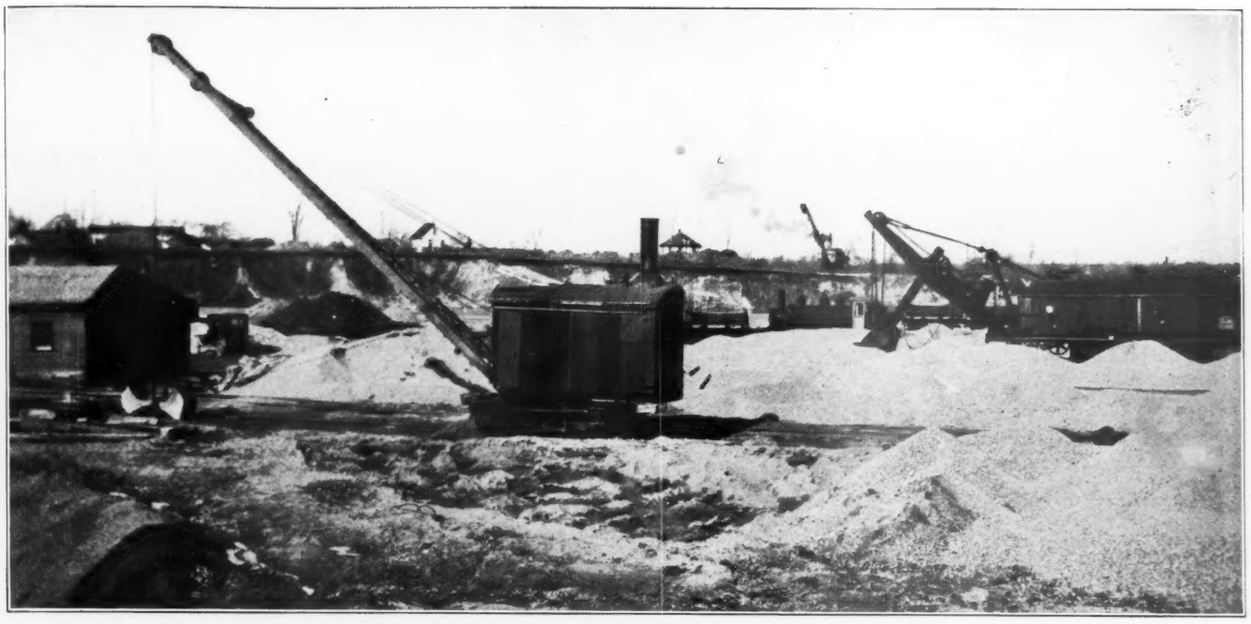
Finally the victim is gotten out. He is given medical treatment. In a very few days he recovers and then we apply the remedy. Why not take preventive measures before the accident? Several cases of this kind have occurred, but the outcome in every similar case is not always so fortunate.

Acknowledgment

This pamphlet was drafted by Felix Guenther, Jr., general superintendent, Pennsylvania-Dixie Cement Corp., Kingsport, Tenn., and Stewart J. Owen, Jr., safety engineer, National Safety Council, Chicago, Ill. It has been approved by the members of the Cement Section, the Safe Practices Conference Committee, and the Executive Committee of the National Safety Council, and by the Institute of Makers of Explosives.

Hold Hearing on Proposed Closing of Indiana Traction Line

On closing the hearing of the petition of the Indiana Railroad to abandon a traction line between Alexandria and Tipton, Ind., Howard Ellis, of the Public Service Commission, announced that he would hear the objections offered by the Western Indiana Gravel Co., operators of the Stilwell gravel pits near Alexandria, on June 5th. Evidence presented by traction officials showed that the line has been losing $20,000 annually. On the other hand, a switch from the main line serves as the principal outlet for the Western company's gravel shipments, giving them just cause for opposing the proposed abandonment.



Yard view showing storage piles. Quarry face in the background.

Each Size of Gravel Washed Separately at Plant Near Buffalo, N. Y.

Two Deep Wells Drilled to Provide Adequate Supply of Water to Plant

THE use of one or two washers for the cleansing of sand and gravel is not uncommon in modern aggregate plants where the removal of silt, clay and foreign trash is necessary. One New York state plant, however, is using five scrubbers of the screw type in what is considered a model installation of this class of equipment. Here three sizes of gravel and two sizes of sand are produced, an individual scrubber being installed for each of the classes of material to insure the perfect washing and scrubbing of the final product and the removal of all foreign material.

This model installation is owned by the Carroll Bros., Inc., of Buffalo, N. Y., at its Clarence, N. Y., plant. The company is headed by C. Van Clief, president, and R. A. Van Clief, first vice-president.

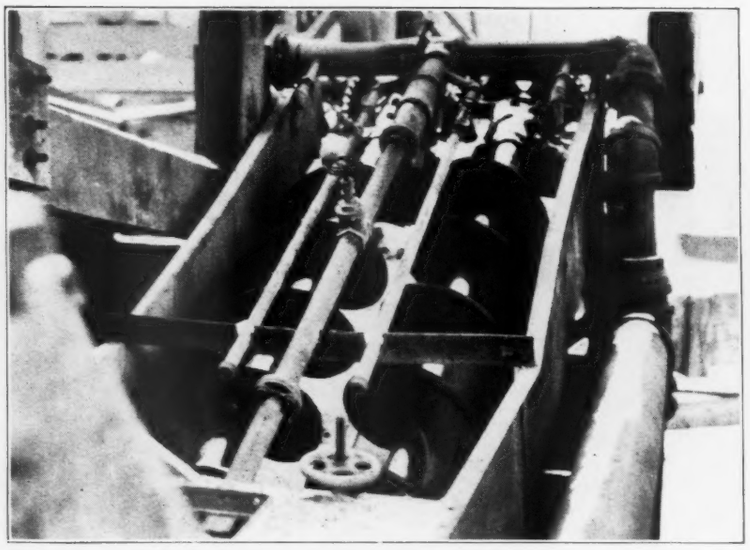
John H. Fite, superintendent, is well known in Southern phosphate operations. His hobby is shooting, and it is no secret that a range with a clay-pigeon "slinger" near the plant is a mighty busy place during his spare moments. Followers of this sport are not astonished to see the name of John Fite heading the top of the list at regional and national "shoots"—in fact, it is said on good authority that John's usual prize money pays his expenses to the meets.

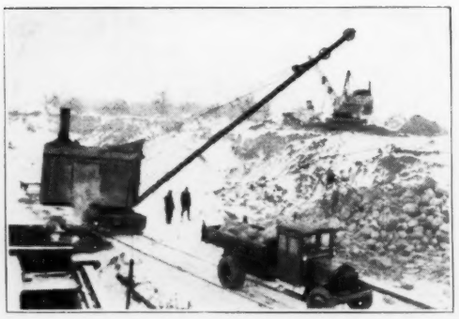
At the present time, the Carroll Bros. pit is worked by a Bucyrus-Erie Model C 14, 1½-cu.yd. drag-line, operated from the top of the bank. A cut from 35 ft. to 40 ft. in height is usually taken, part of it being below the water-table. This same unit is used during the winter months for stripping operations, for, with its 80-ft. boom, the overburden is easily overcast to an old pit alongside the new cut. For standby service a Vulcan railroad-type shovel is maintained.

From the drag-line the raw material is sent to a track hopper at the plant over a 1,500-ft. standard-gauge track in Western 10-cu.yd. side-dump cars, of which 3 or 4 make a train hauled by a Vulcan 30-ton steam locomotive.

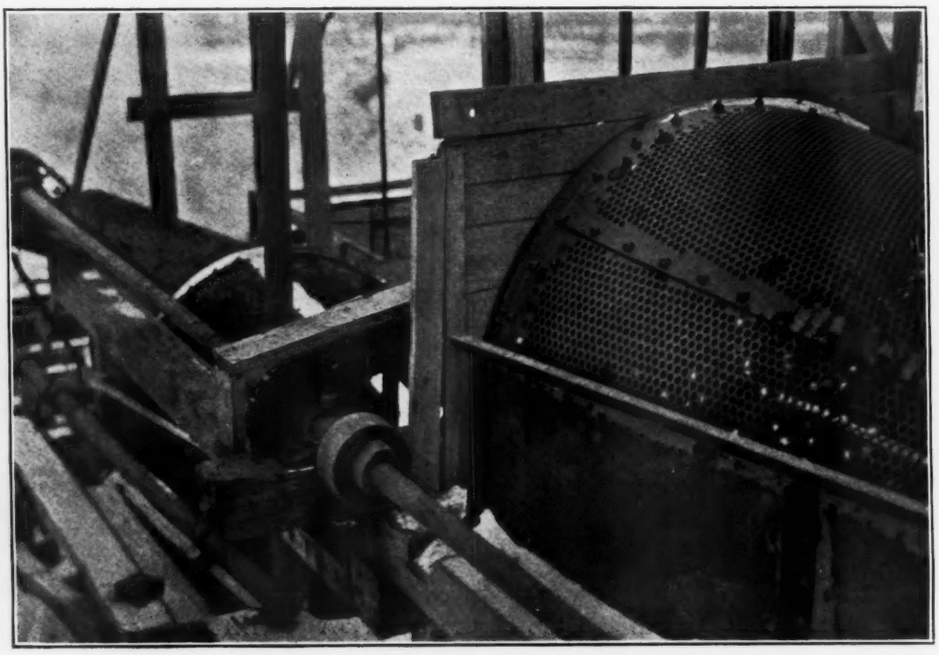
The processing equipment used, from this point on, was designed and built by the Brown Hoisting Machinery Co., now known as the Industrial Brownhoist Co. Material from the cars is dumped into a steel-lined hopper, 16 ft. square. A grizzly, made of track rails placed on 8-in. centers, prevents boulders and "niggerheads" from getting into the hopper. These large stones are dragged aside and later picked up by an Osgood railroad-type crane and deposited in a large pile. A ready market is found for them for rock-fill and heavy foundation work. County highway commission trucks are frequently seen at the plant being loaded with these stones. The Osgood crane uses a Geo. Haiss ½-cu.-yd. clam-shell bucket in handling this heavy material.

Directly beneath the hopper, a Brownhoist plate

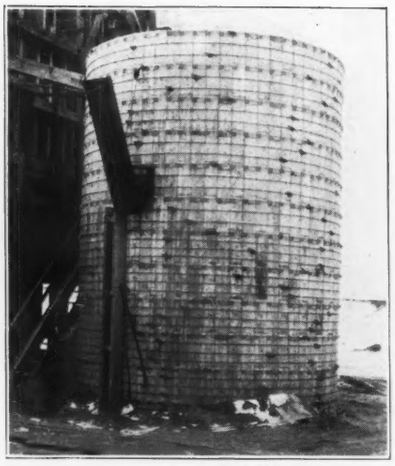




Left, reading down—One of the five classifiers used to remove clay and foreign material. A view of the Carroll Bros. plant. John H. Fite, superintendent, who shoots clay pigeons during spare moments. *Above*—Clam-shell loading niggerheads into county-highway truck. *Lower right*—View showing one of the conical screens and its chain drive.



One of the wells and tank.



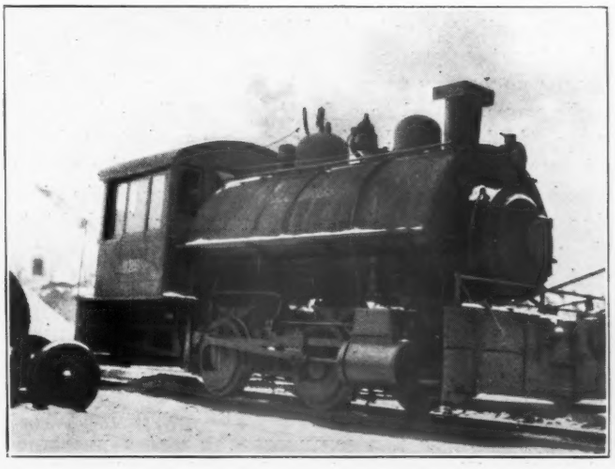
Silo-type sand-loading bin.

Car puller used at the plant.

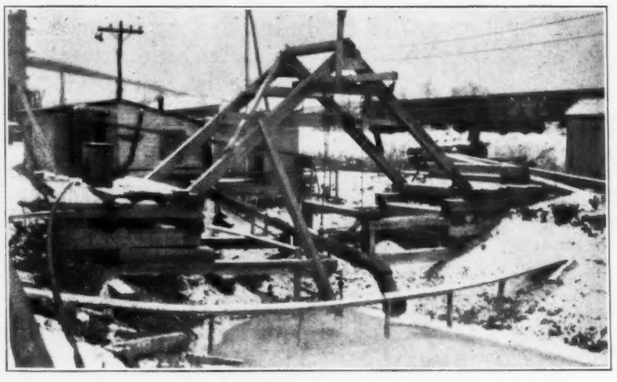
feeder loads a 30-in. Brownhoist conveyor (No. 1) which is 104 ft. long between centers and leads direct to the primary scalping screen. The plate feeder and the tail pulley of the conveyor are located in a pit below ground level. The Brownhoist rotary scalping screen and the 4-in. Allis-Chalmers McCully crusher are conveniently placed in a direct line with the tipple. The screen, which measures 5 ft. by 12 ft., has 2¾-in. perforations, and "rejects" fall direct into the crusher spiders. "Throughs" fall into a hopper that feeds the main plant conveyor (No. 2)—a 113-ft. Brownhoist unit carrying a 12-in. belt and leading to the tipple. Crushed material from the McCully crusher is chuted to a Brownhoist return-circuit conveyor (No. 3), 209 ft. long and using a 24-in. belt, and is returned to the scalping screen by the first conveyor. A single 60-hp. General Electric motor operates the entire equipment in the scalping and crushing process as well as the first two conveyors, while a 40-hp. General Electric motor drives conveyor No. 3.

Upon arrival at the tipple, the material is sent through three 3-ft. Brownhoist conical screens for classification and preliminary washing. The first screen, with ¼-in.-mesh wire cloth, separates the sand from the gravel, the sand passing two Perfect No. S-42 classifiers. The other two conical screens produce ½-in. to ¾-in., ¾-in. to 1½-in., and 1½-in. to 2¾-in. sizes of materials. A single 20-hp. General Electric motor drives the screens. Each of these grades is sent to an individual Perfect classifier for a final scrubbing and washing before being spouted to the loading bin beneath. Three Perfect classifiers—one No. 38G and two measuring 25 in. by 4 ft. by 14 ft.—handle the gravel. The two sand classifiers produce a coarse sand for concrete purposes. The "fines" discharged with the waste water are reclaimed by an Allen 10-ft. Model 110S sand cone which is set to produce an evenly graded masons' sand. All the classifiers are driven by Westinghouse motors.

The use of a scrubber for each of the products



Locomotive used for transporting stone from quarry to plant.

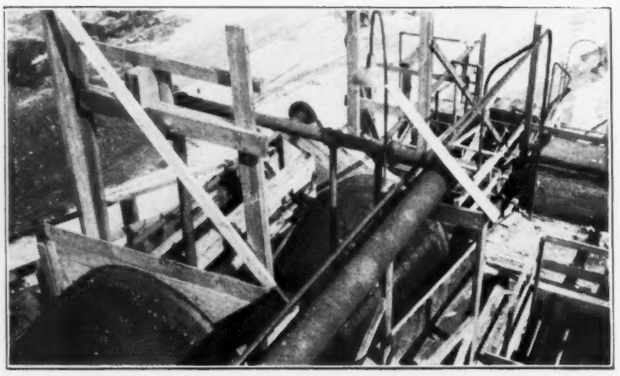


Fresh-water sump. Note suction pipe from centrifugal pump and the A-frame tackle.

obviously results in a high degree of cleanliness. Where both sand and gravel are sent through a single machine, the conglomeration tends to retard the scrubbing action. This installation, with an individual classifier for each class of material to be scrubbed, secures the maximum action without the possibility of overloading, as the combined capacity is far in excess of that of the classifying screens.

The masons' sand from the Allen cone is stored in a Hart Bros., Buffalo, N. Y., concrete-stave silo-type bin, 30 ft. in diameter by 40 ft. in height. This bin has a capacity of 500 tons. All the masons' sand thus produced and sold was wasted formerly by being discharged into a large pond with the

The primary scalping screen, crusher, and elevators.



Two of the conical screens used for classification.

wash-water. Considerable revenue has been obtained from this product, and the installation of the equipment has proved quite profitable.

A live-storage capacity of 2,000 tons of gravel is obtained in the loading bins. Resting on heavy concrete pillars and understructure, this building is made to last. Trucks have access to dumping gates either beneath the bins or along one side. The opposite side fronts on the plant railroad siding for car-loading. This siding has 4,100 ft. of trackage and connects with the West Shore R. R., a spur of the New York Central R. R. Gravity assists in the movement of the empty cars to the loading bins. A Caldwell car puller handles the loaded cars.

The problem of supplying the screens and classifiers with sufficient water was not an easy one at the Carroll Bros. plant. Without an available supply of water from a shallow pond or a near stream, it was necessary to resort to deep wells. Two 8-in. wells were drilled to a depth of 165 ft. and 185 ft. respectively, each having a casing sunk to a depth of approximately 140 ft. For pumping the water, an air-lift system is used. A compressed-air pipeline, usually about 3 in. in diameter, is extended into the well to a depth of 40 ft. or more below the normal water-pumping level. This pipe has an 180-deg. elbow at its end, which directs the air upward. The compressed air, upon escaping from the pipeline, expands and rushes upward, carrying with it large slugs of water. A Pennsylvania 9-in. by 12-in. compressor, driven by a 40-hp. General Electric motor, furnishes the compressed air at a pressure of 50 lb. The water flows from the wells into a small sump, from which a Fairbanks-Morse 10-in. by 12-in. centrifugal pump, driven by a 100-hp. General Electric motor, sends it to the washing screens and other washing and scrubbing equipment. While the air-lift system of pumping is not as efficient as either the plunger-pump or deep-well-turbine method, its simplicity and installation economy offer desirable features.

Two S. C. Johnson batch hoppers provide facilities for the sale of batched aggregates. Both General Electric and Westinghouse motors are used. Quaker City rubber belting is used on all conveyors.

Drag-line stripping overburden, which is deposited into the old pit.

A. R. B. A. Increases Pan-American Highway Scholarships

Engineers and highway superintendents from Pan-American countries are being trained in American road-building methods through a scholarship plan supported by the American Road Builders' Assn.

Two road builders from each of fifteen Pan-American countries will be appointed in 1931 for six months' study of American highway methods and equipment. These men are selected by the road department or commission of their native country to meet the following requirements: studies completed in an adequate school, under thirty years old, knowledge of English, good health, diligent, good character, and a serious intention to make road building their profession. They will study and travel under the supervision of the American Road Builders' Assn.

After a course of study in the association offices in which they become familiar with the extent and location of highway activities, the men visit state highway departments, equipment and material manufacturing plants, and various federal, state, county and city road and street construction projects. The technical highway director of each country designates the class of work on which the student engineers specialize and complete reports are made by the students.

The men work in the various departments of road building operations and equipment manufacturing processes, in some cases, to become familiar with the details of the work and to obtain first-hand information about machines used.

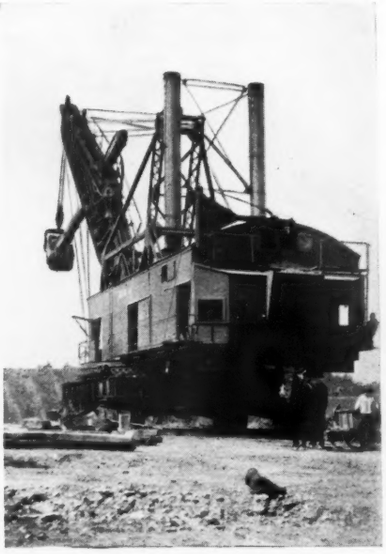
A Resumé of Blasting Methods Employed in Western Pennsylvania*

By C. H. COALE

PITTSBURGH, Pa., is best known as an industrial center because of the enormous tonnage of iron and steel which is produced there. Most of us think of this city and its environs as a panorama of great mills and furnaces where great train-loads of iron ore are converted into an endless variety of fabricated products. Indeed, the manufacture of iron and steel looms so large that other collateral industries are at least partially eclipsed. Coal and coke are of major importance. Fuel always is, everywhere. And limestone, too, is an essential part of the picture, for without an abundance of fluxing materials the iron-and-steel industry would soon cease to function.

Nature set the stage for the present-day development of this region by providing ample supplies of these raw materials. Enormous quantities of Vanport limestone are obtained from the workings in Lawrence, Armstrong and Butler Counties in western Pennsylvania for use as a flux in the steel mills of that district, for road building and for the manufacture of Portland cement. Much of this stone is mined underground, but where the overburden is not excessively deep, open-pit quarrying is also extensively practiced.

This limestone deposit (Fig. 1) does not exceed 22 ft. in thickness at any point, but, because it lies in ledges of quite different character, it is generally advisable to quarry it in two, or sometimes three, benches. Whether it is worked in benches or full face, a buffer is usually carried; that is, instead of cleaning up the material broken by each blast, the whole, or a part of it, is left in place until the next blast has been fired. This blanket or buffer of stone affords stronger resistance for the charges than could otherwise be secured in a properly-balanced shot in a low face, and thus increases fragmentation. Furthermore, in quarries where the space between the loading track and the face of stone is limited, the buffer acts as a protection for the track by preventing the rock from being thrown out so far.



One of the huge shovels used in stripping.

The drilling in the Vanport seam is done by either well drills or high-speed hammer drills, the latter being now more generally used. These are mounted on low wagons for convenience in handling. Steel 1¼ in. in diameter is used to drill holes. A change of steel for every 7 ft. of bore hole is the usual practice, the bit being decreased in diameter 1/16 in. with each change. Bore holes start at 1¾ in. to 2 in. in diameter and finish about 1⅝ in., so that they will accommodate 1½-in. cartridges of dynamite. This type of drill is very fast. Many operators drill from 40 to 50 ft. per hour.

On account of the frequent partings, bore holes are usually drilled only to the desired depth, not below grade. While small-diameter holes must be spaced closer than well-drill holes, the greater speed and economy of operating hammer drills far offsets this seeming disadvantage. Moreover, the smaller holes can be loaded higher with explosives, and this, with the closer spacing, results in better primary fragmentation.

* Reprinted from *Du Pont Magazine*.

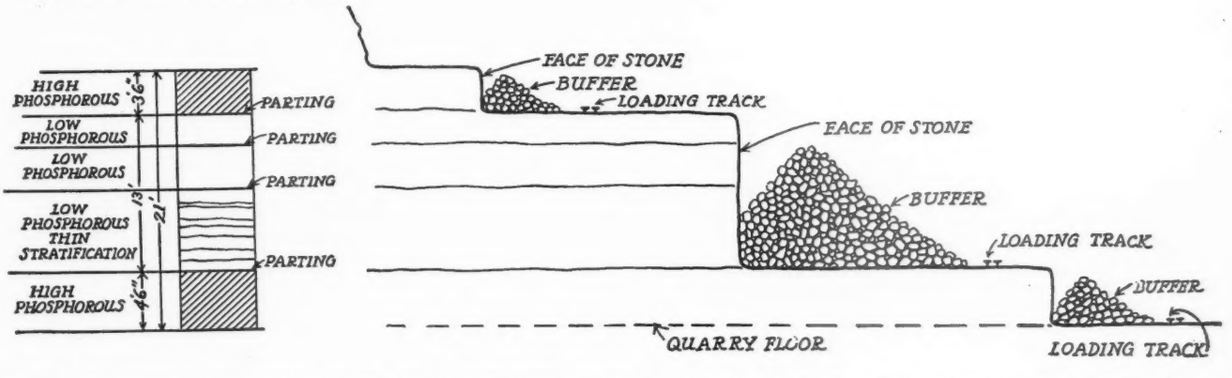


Fig. 1. A representative cross-section of the Vanport limestone seam, and a sectional view of three-bench quarry showing how the buffer is carried between the loading tracks and the face of stone.

Two methods of primary blasting are used: First, firing single or multiple rows of holes by means of electric blasting-caps; and second, single-hole blasting by means of blasting-caps and fuse.

In the first method holes are spaced from 4 to 5 ft. apart, depending upon the height of the bench

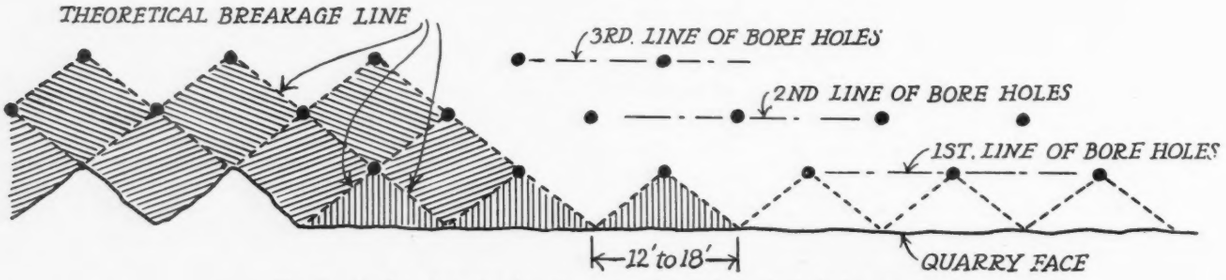


Fig. 2. A plan view showing the quarry face where single holes are shot.

being worked. From 30 to 400 holes may be fired in a blast. The common practice is to fire from electric power lines but blasting-machines are also employed to some extent. When power current is used, caps are connected in parallel series, usually a maximum of 12 or 13 caps to the series.

Fig. 2 illustrates what is commonly referred to as the single-hole method of blasting. By this method the drill holes are placed along the face of the stone at 12- to 18-ft. intervals and are shot with blasting-caps and fuse, leaving an irregular saw-toothed face. Each successive row of bore holes is

High-speed hammer drills mounted on wagons.

then located so as to work to the best advantage in the points left by the previous blasts. Somewhat heavier charges are necessary on account of the increase in burden resulting from the wider spacing of holes, but this is offset by the decreased drilling cost. Of the two methods in use, the simultaneous firing of a whole row, or of a number of rows of holes, is the more general practice.

Several kinds of explosives are employed successfully in this buffer blasting. Formerly 40-per cent. quarry gelatin was the most extensively used. It gave the most satisfactory results, both where the full ledge was blasted and also where the face was worked in benches. Particularly was this the case if the holes were wet and a large number of them were fired in one shot so that the charges loaded first had to be left standing for a time.

When the water resistance of a gelatin was not needed, a 40-per cent. ammonia dynamite was found very satisfactory for bench blasting. When low-density ammonia dynamites were developed they were substituted to some extent for the 40-per cent. ammonia explosives previously used. Recently semi-gelatin dynamites have been tried in comparison with both 40-per cent. quarry gelatin and the ammonia dynamites, and have given very good execution in both the full-face and the 13-foot bench. Where they can be substituted for gelatin on a cartridge basis they afford a substantial saving in explosives costs because they are considerably bulkier—87 cartridges, 1½-in. by 8-in., to the 50-lb. case, instead of 62. Some little 60-per cent. gelatin is used where the holes are drilled with wider spacing. For secondary blasting 30- or 35-per cent. ammonia-gelatin, in 1-in. by 8-in. cartridges, seems to be the most satisfactory explosive.

Carrying a buffer would be neither a practical nor a desirable method of quarrying where the face is over 50 or 60 ft. high, but in the Vanport limestone very satisfactory costs are secured—around 6 to 7c per foot of bore hole for drilling with high-speed hammer drills, and a breakage of approximately 2½ to 3⅓ tons of limestone per pound of explosive.

Proposes Master Road Plan

(Continued from page 28)

14. The primary system (state highways) should be financed by current funds or bonds, depending on the degree of completion and transportation requirements.

15. The secondary system (county-trunk highways) should be financed by state-aid and local taxes or bonds.

16. Third-class highways (purely local roads) should be financed by local taxes, county bonds, or special assessments.

17. In metropolitan areas, which are carrying a large percentage of the total state traffic, relief measures on trunk highways should be given consideration by the state through regional planning bodies.

Original Design of New York Gravel Plant Altered to Suit Conditions

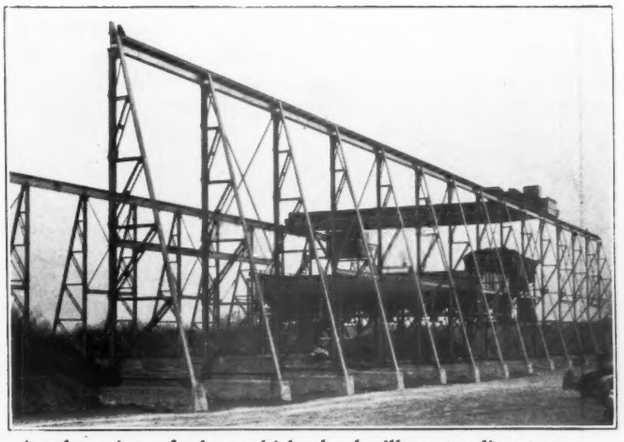
Dolomite Products Co., Inc., Installs New Dredging and Washing Equipment

By W. E. TRAUFFER

A NUMBER of years ago John H. Odenbach first attracted the attention of the aggregate producing industries when he formed the Dolomite Products Co., Inc., and took over the Gates crushed-stone plant a few miles west of Rochester, N. Y. This plant had operated at a loss during each of the previous four years of its existence. Under the management of Mr. Odenbach the plant soon showed a profit and now has a production of 3,000 tons daily.

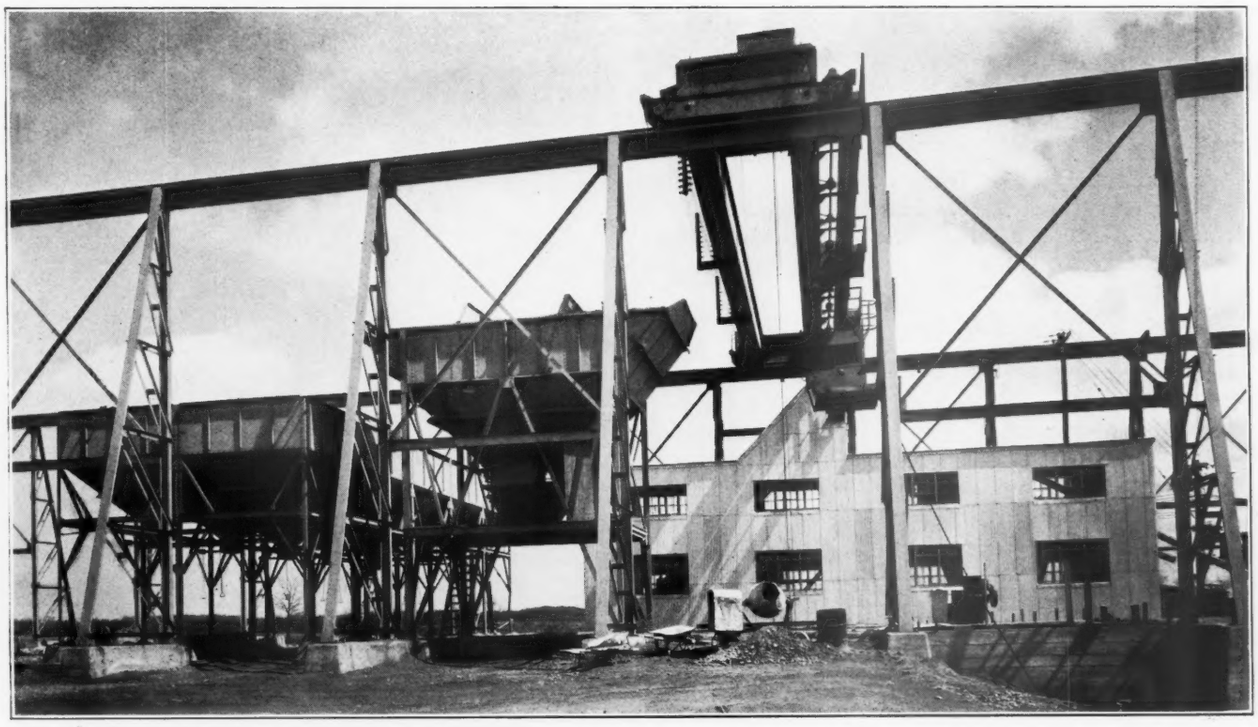
In July, 1929, he opened a new plant of his own design at Penfield, about 6 miles east of Rochester. This plant created somewhat of a sensation in the crushed-stone industry because of its original design and low-cost operation. It has a capacity of 600 tons per hour but is operating at present on a production of 1800 tons daily.

Not satisfied with his achievements in the crushed-stone industry, Mr. Odenbach next turned to the sand and gravel industry. His purpose in doing this was not primarily to produce a larger quantity of coarse aggregate, as the productive capacity for this type of material in the Rochester district already exceeded the demand, but to produce sand to go with the crushed stone produced by the Gates and Penfield plants.



Another view of plant which clearly illustrates live-storage capacity possible with overhead-crane system.

The deposit chosen for this plant is a large hill of sand and gravel located on the Rochester to Penfield highway, about 4 miles east of Rochester and only two miles from the Penfield plant. This hill is 113 feet in height with the top level with the highway and the bottom bordering a small creek. This combination is not ordinarily considered an ideal one as the material must be elevated to the top

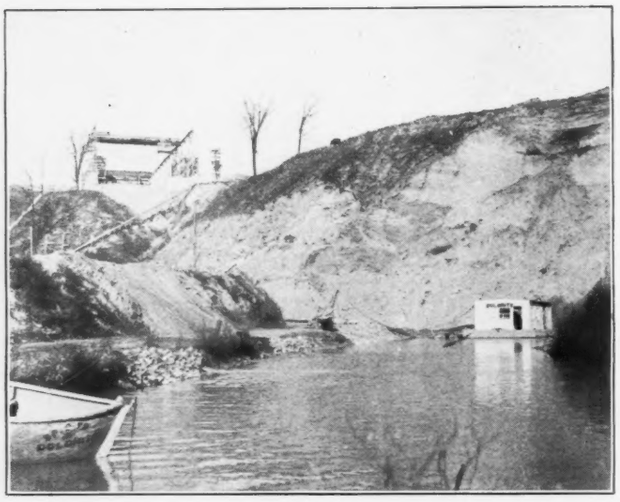


View of the plant with truck-loading and batching bins at left. Screening building and crane which handles all materials at right.

of the hill either before or after sizing takes place.

These factors proved to be no obstacle to Mr. Odenbach, however, who designed a plant to fit these conditions. Like his other projects, this one also has many unusual features and is strikingly original in design. The top of the hill was leveled up for the plant site and an artificial pond dug into the base of the hill for a dredge pond. The dredge, which was also designed by Mr. Odenbach, was built on the job and launched in the pond. A booster pump was installed part way up the hill to share the 135-ft. lift with the dredge pump. Water for the pond was taken from the neighboring creek which was connected to the pond by a small lock so that additional water could be let in or drained out whenever desired.

The plant design is notable for its simplicity and the unusual method of handling materials. No elevators or conveyors are used, all sized material being handled by a high-speed overhead electric crane. Sized material is discharged into ground-

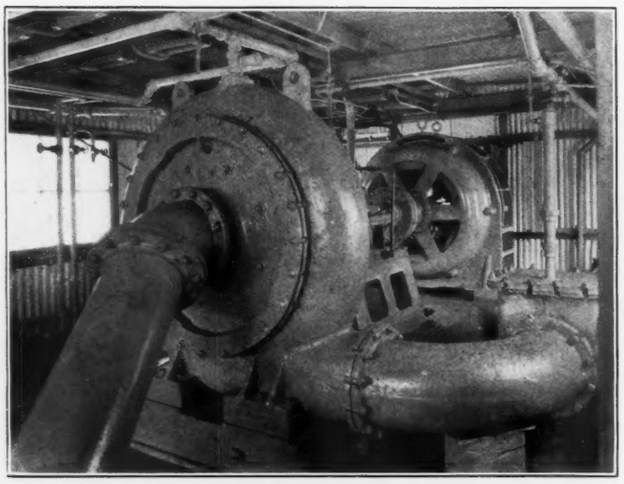


The dredge pond with dredge at foot of bank. Plant at left above.

level concrete pockets from which it is rehandled to bin or ground storage. The plant has a capacity of about 130 tons per hour and can be operated at full capacity by 6 men and a superintendent. It went into operation on June 15, 1930.

The dredge has a 20-ft. by 40-ft. electrically-welded steel hull. This was built by the Genesee Bridge Co. and has 6 watertight compartments. The superstructure and intake boom are also of steel and the roofing and siding are of corrugated metal. The boom is in the form of an A-frame and is supported by two cables from the superstructure. It supports the 35-ft. intake nozzle.

The 12-in. Amsco dredge pump is of the regular side-intake, bottom-discharge type and is direct-driven through a flexible coupling by a 300-hp. Fairbanks-Morse motor. The pump speed is controlled through grids and a drum controller. A 3-drum American Hoist & Derrick Co. hoist at the forward end of the dredge is gear-driven by a 15-hp. General Electric motor. One drum is used for raising and



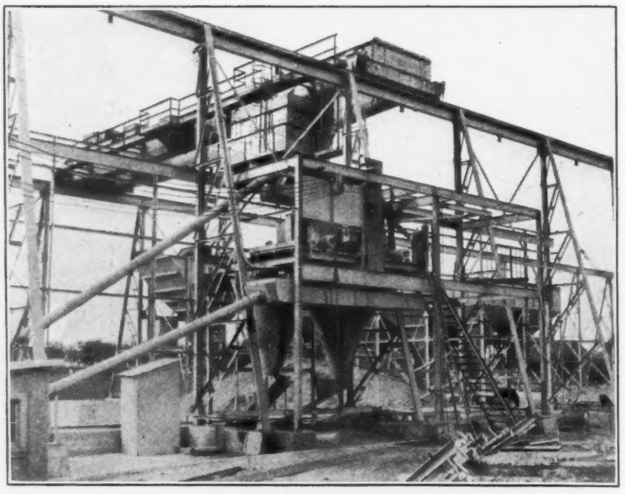
The 12-in. centrifugal dredge pump and its 300-hp. motor. The motor-control grids are at left above.

lowering the nozzle and the other two for moving the dredge by means of shore lines.

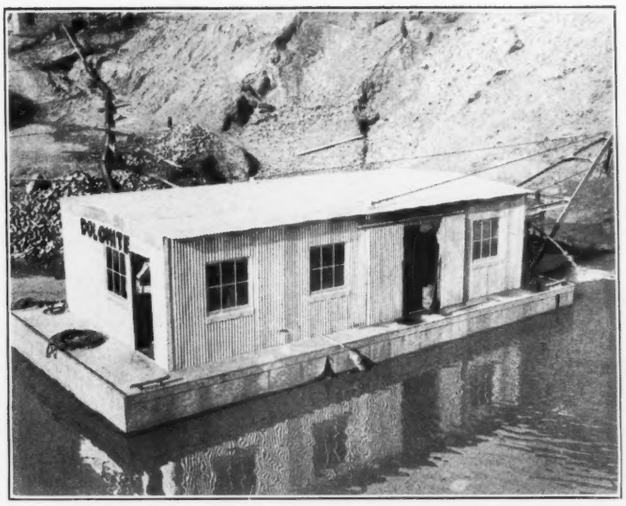
The dredge pump is primed by a 4-in. Morris centrifugal pump which is direct-driven by a 30-hp. Westinghouse motor. This pump also furnishes water for a jet which can be used for washing down the bank when necessary. This jet and the controls for the hoist and pumps are conveniently located so that the dredge operator can control all operations without leaving his post.

In the original layout the dredge pump elevated the material 35 ft. to a small concrete building where a 10-in. booster pump elevated it the remaining 100 ft. to the top of the plant. It was found, after a short period of operation, that the load on the two pumps was not evenly distributed and that capacity was being lost for this reason. This system was used for the balance of 1930, however, and the two new 12-in. pumps were installed during the winter.

A new steel-frame booster house inclosed with corrugated metal was built at an elevation of 25 ft. above the original one. This houses the 12-in. Amsco booster pump which is direct-driven by a



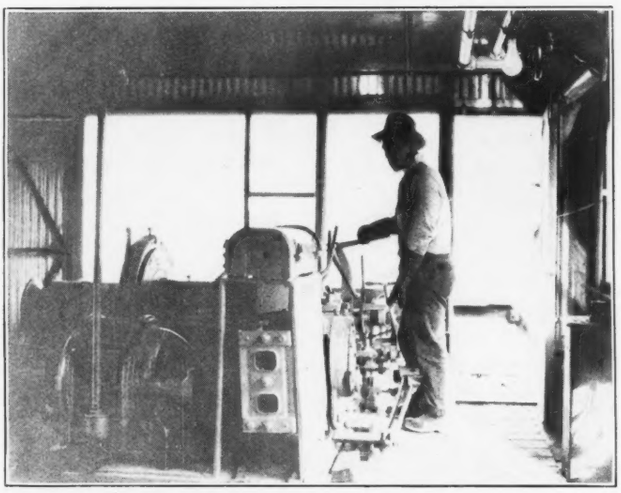
View before the building was inclosed showing the two original sand cones. Dredge-discharge line and overflow lines at left.



A closeup of the dredge showing discharge line to booster pump house.

200-hp. Fairbanks-Morse motor. The lift is now 60 ft. from the dredge to the booster pump and 78 ft. more to the plant. Both pipe-lines are about 300 ft. long. Naylor spiral-welded pipe and Victualic flexible couplings are used.

The dredge line discharges at the plant to a steel sluice box where the material is partially dewatered and the force of the flow broken. The sluice box discharges to a 4-ft. by 7-ft. Niagara double-deck vibrating screen which does the coarse sizing. This

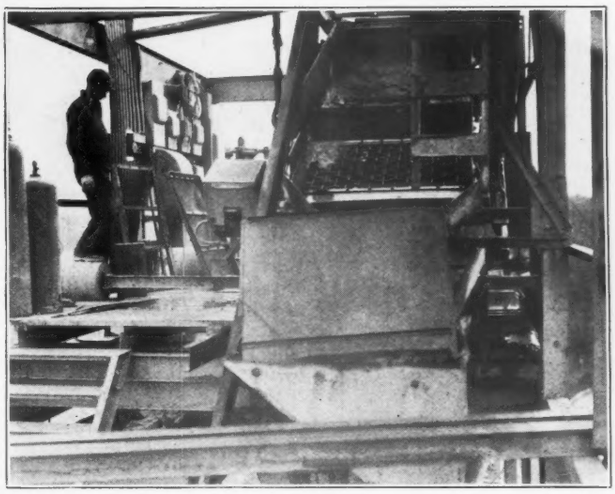


Dredge operator at controls with 3-drum hoist at left.

has 2¾-in., and 5/16-in. mesh wire cloth, respectively, on its top and bottom decks. The material over 2¾-in., which is almost negligible, is chuted directly to a concrete collecting sump. The 5/16-in. to 2¾-in. stone goes to a revolving scrubber screen consisting of a homemade scrubber mounted within a 4-ft. Kennedy revolving screen. Altogether four sizes of gravel are produced, all of which discharge to separate concrete sumps.

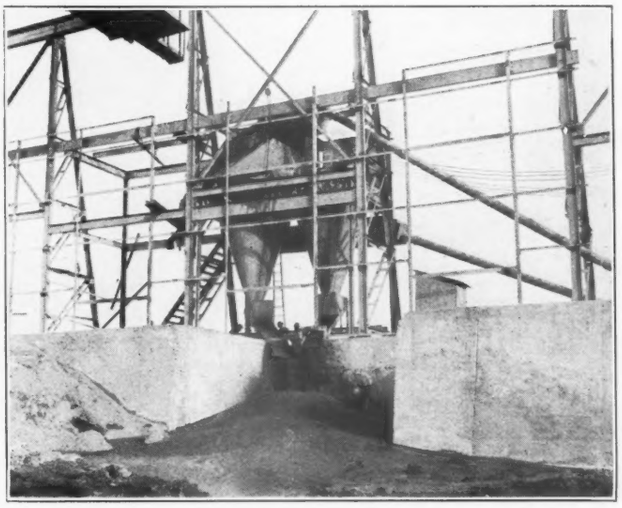
The material passing through the 5/16-in. lower deck of the vibrating screen flows to a series of three 10-ft. Link-Belt sand-settling cones. The various sizes of sand produced also discharge to separate concrete pockets. The overflow water goes through a 10-in. Naylor pipe-line to an artificial settling pond at the bottom of the hill near the dredge pond. This in turn overflows back into the dredge pond. The sizing building has been inclosed with corrugated-metal siding during the winter.

Originally two vibrating screens were used in this plant. The first was a double-deck screen which scalped all material over 2¾-in. in size to a No. 5 gyratory crusher. All material under 5/16-in. in size went to the two sand cones. The aggregate passing through 2¾ in. and retained on 5/16 in. went to the second triple-deck, vibrating screen which has since been taken out. Four sizes of coarse aggregate were



The 4-ft. by 7-ft. double-deck vibrating screen which does the coarse sizing.

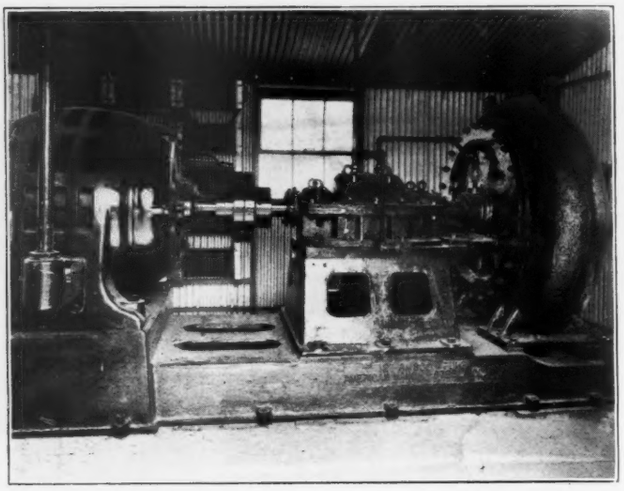
produced by this screen. Soon after operations began it was found that the percentage of sand in the deposit was even greater than anticipated. The amount of oversize stone to be crushed was almost negligible. For these reasons it was decided to remove the crusher and the triple-deck vibrating screen as the double-deck vibrating screen and the revolving screen alone had ample capacity to size the entire output of gravel. The third sand cone



The two original sand cones with vibrating screen above. Dredge discharge and overflow waste lines at right.

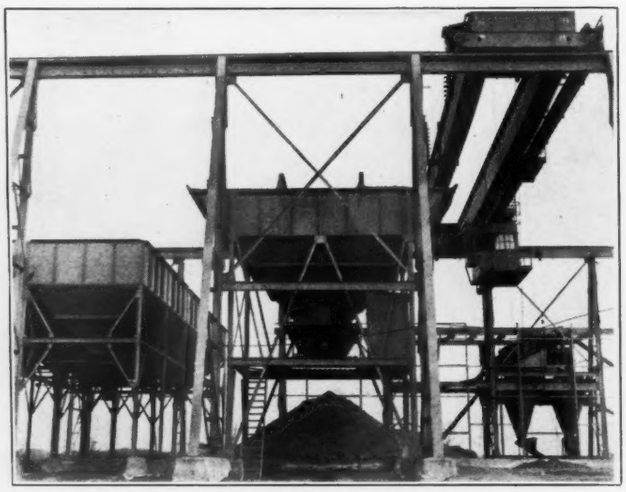
was necessary for the same reason and the addition of a fourth cone is now contemplated.

The sized material is taken from the concrete ground bins by the Cleveland Crane & Engineering Co. 6-ton overhead traveling crane which handles a 2½-cu. yd. Hayward clam-shell bucket. This crane has a span of 80 ft. and operates on a steel runway 280 ft. long. It easily handles an output of 150 tons per hour. The crane serves a threefold purpose. It takes the material from the ground bins to truck-loading bins or to stock-piles as desired. It also rehandles from stock-piles to the bins. The live stock-pile capacity under this arrangement is about 20,000 tons.



The 12-in. booster pump and its motor drive.

For ordinary shipments trucks are loaded from ten 65-ton capacity steel bins arranged in two rows near the center of the plant so that trucks can drive in one side and out the other without interference. These bins were furnished by the Beaumont Mfg. Co. A 3-compartment Blaw-Knox batcher bin of 150-ton capacity alongside these bins is used for weighing out batch shipments. All other shipments are weighed on a 15-ton Buffalo truck scale located at the plant office near the entrance to the property from the highway. There are no rail connections and all shipments are made by truck. The dredge, booster pump house, and the screening plant are all inclosed with Robertson protected-metal siding.



A closeup of the plant before the recent changes were made.

The main office of the Dolomite Products Co., Inc., is at 544 Lincoln-Alliance Bank Bldg., 183 Main St., East, Rochester, N. Y. Officers are: John H. Odenbach, president, treasurer and general manager; Matthew P. Odenbach, vice-president; Frank J. Wadell, secretary; and H. N. Clark, general superintendent.

Valuable Service Offered to Highway Contractors by Central Rock Co.

The Central Rock Co., Lexington, Ky., during the past year, has been rendering a commendable service to contractors bidding on Kentucky state-highway work, which has created considerable good will and aroused much favorable comment from these contractors.

The service consists of tabulating and posting on a large bulletin board placed in front of the building in which the letting is held, a complete list of bidders, description of projects and prices quoted. While these bids are being tabulated for the bulletin board, a separate list is made of the two low bidders on each job and taken to an adjoining room where they are mimeographed. At the conclusion of the letting, a report on the complete proceeding appears, bound in a neat blue cover and called "The Blue Sheet" which carries the company's advertising. The following shows the style used in listing the various items:

KENTUCKY STATE HIGHWAY
DEPARTMENT LETTING
April 29, 1931

CARROLL F A 198 CB

Con. Pipe	$49997.	Woodruff & Co., Louisville, Ky.
	51903.	Georgetown Const. Co., Georgetown, Ky.
Vit. Pipe	49997.	Woodruff & Co.
	51903.	Georgetown Const. Co.

FRANKLIN F A 221 BG

Con. Pipe	72933.	Mason Payne Co., Frankfort, Ky.
	73057.	Gridley Const. Co., Knoxville, Tenn.
Vit. Pipe	73798.	Gridley Const. Co.
	75174.	Mason Payne Co.

CALDWELL S P 10 EGS

W B M Surf. Mix		
Light Oil	18682.	Corum Bros., Madisonville
	22465.	R. M. Robinson, Owensboro
Light Tar	17884.	Corum Bros.
	21476.	R. M. Robinson

This system has been so thoroughly worked out that as soon as the last bid is read, and the contractors are beginning to leave, copies of "The Blue Sheet" are handed to them. The entire operation is performed by the regular office staff.

"The Blue Sheet" was first inaugurated by the Central Rock Co. a little more than a year ago, and has been very successful from the start, which fact is emphasized by the numerous requests received by mail after each letting.

View from Plant No. 3 showing Plant No. 2. Plant No. 1 is barely visible in the distance.

Flexibility of Screening Facilities Proves Feature of Alabama Plant

Montgomery Gravel Co. Puts its Third Unit on 300-Acre Tract in Operation

AMONG the many requirements of a modern aggregate plant, possibly none is looked upon as so important as flexibility. With the highway specifications in many states becoming more exacting each year and departing farther and farther from building-materials specifications, the problem of screening becomes acute. Many small plants are forced, through inadequate screening facilities, to produce one type of material at a time, and then, after complete screening equipment changes, to produce the other required materials. The loss of time and the labor involved is indeed costly. Flexibility in the screening equipment will prevent this loss. Properly-designed plants can meet any and all specifications with the minimum number of changes—in fact, not a few plants are capable of producing materials of widely-separated specifications simultaneously.

The Montgomery Gravel Co., Montgomery, Ala., in designing its new plant—the third unit on its 600-acre tract north of Montgomery—set out to achieve the maximum flexibility necessary to meet the wide market which it serves. Its plans called for the use of two pairs of vibrating screens, to be located in the steel-framed tipple, each pair to be completely independent of the other pair. These screens are 3-deck units producing four sizes of materials.

The material is excavated by means of a 12-in. dredge pump, and the sludge is pumped direct to the

Dewatering and vibrating screens before being housed in.

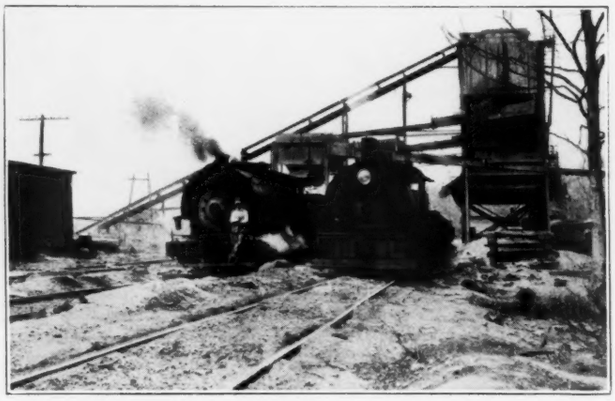
The screens in operation after the plant started production.

Sand tanks with railroad cars below.

top of the tipple, the discharge piping being supported by a wooden incline. The sludge, upon reaching the top, is discharged into a steel box. Here the sludge is divided into two wide flumes, leading in opposite directions and each feeding one pair of screens.

The two pairs of screens are located in the top floor of the tipple, one pair occupying one half of the room and the other pair the opposite half. As the sludge leaves the two flumes, each stream is again divided, thus producing four streams for the four separate screen units. Before reaching the top decks, the sludge in each stream is dewatered by being passed over a 6-ft. by 6-ft., ¼-in.-mesh gravity screen placed at the head of each vibrating screen. From the gravity screen, the sand and water are flumed to the sand tanks and the gravel passes to the top decks of the four vibrating screens.

To this point the process is similar for all four screen units and the gravel, upon reaching the top decks of all units, is quite likely to average the same in size. With the screens operating in pairs, it is possible to maintain definite-size panels on the decks of each pair to produce two classes of gravels. Thus one pair of screens carries, on its top decks, 2-in.-mesh wire-cloth panels; on its middle decks,

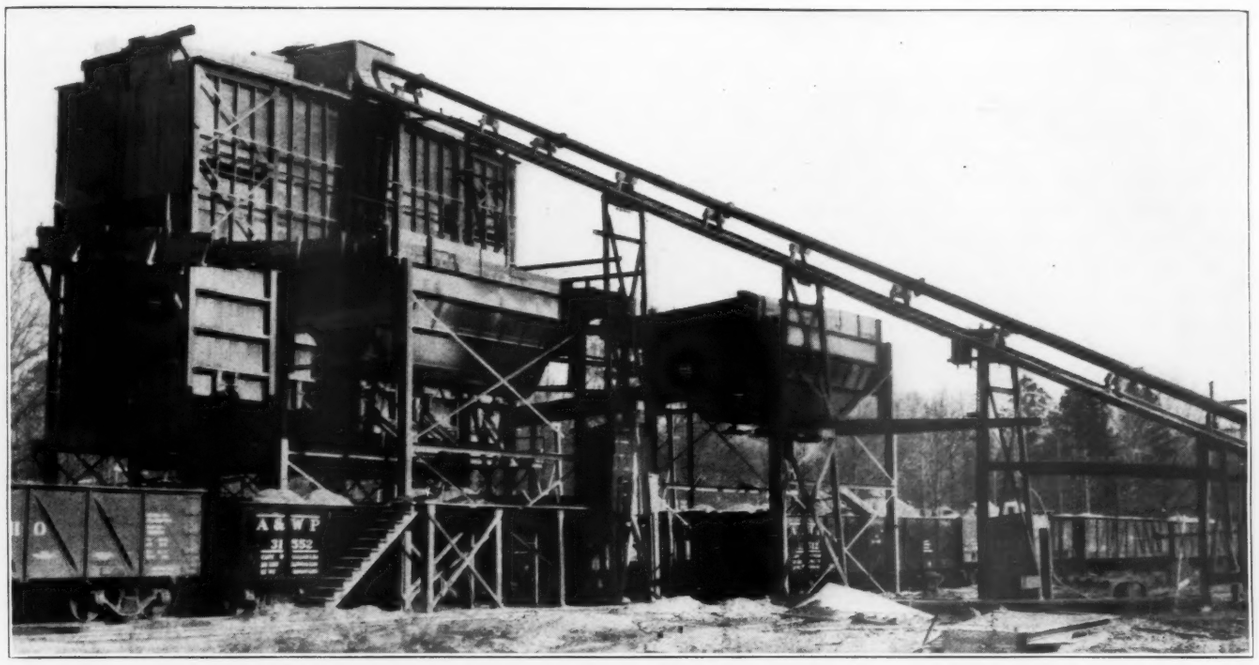


Pair of locomotives used for switching cars in the yard.

½-in.-mesh, or ¾-in.-mesh wire-cloth panels; and, on the bottom deck, ¼-in.-mesh wire-cloth panels. The opposite pair carries similar screen sizes, usually with ⅛-in.-mesh wire-cloth panels.

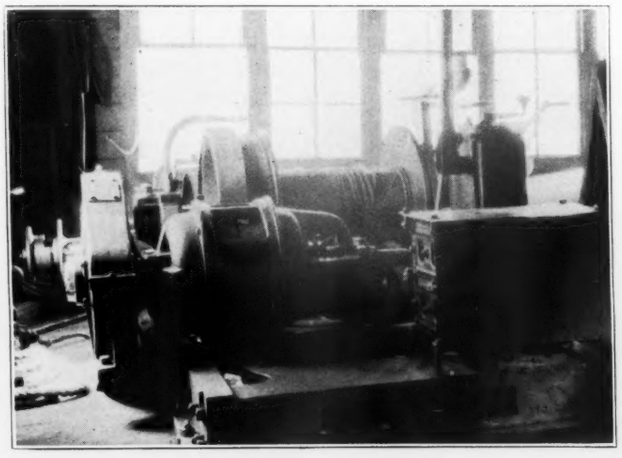
All screens are Niagara 3-ft. by 8-ft. units. Each pair is belt-driven from its own lineshaft which, in turn, is driven by a 10-hp. motor. Ludlow-Saylor and Tyler screen cloth are generally used.

The dredge and pipe-line leading to the new No. 3 plant.



Close-up view of the new plant. Sand tanks in foreground.

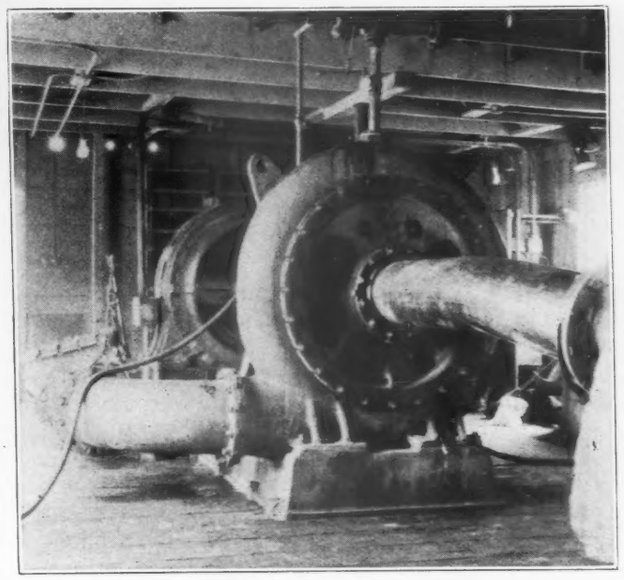
Obviously, the advantage of this paired arrangement of the vibrating screens lies in their ability to operate independently of one another. Should, for any reason, mechanical trouble develop in one pair, its flow of material can be stopped at the discharge box while the opposite pair continues to operate, thus preventing delay in car-loading.



Hoist installation on the dredge.

With an unusually rich alluvial deposit of gravel, the Montgomery Gravel Co. operates under the most desirable conditions. Its deposit averages 40 ft. in depth with a light sand overburden. The material consists of 60 per cent. gravel and 40 per cent. sand and, as there are few pebbles above 2-in. in size, no crushing is required. The deposit, being alluvial, contains a variety of stones, some of which are marble. The mixture of white marble pebbles with other stones in gray and tan shades makes this material most attractive. Many arrowheads have been found in this locality—hence the company's brand name "Arrowhead" gravel.

A dredge pump is ideal for handling this deposit. As the material is not tightly packed, but, in fact, avalanches freely, no cutting chain is required. The dredge contains an Amsco 12-in. centrifugal pump driven by an Allis-Chalmers 2,200-v., 400-hp. motor. The suction pipe is suspended from an extended boom with pulley blocks and it is raised and lowered by means of a Street Bros. 3-drum hoist driven by a 40-hp. motor. The digging end of the suction pipe has a fan-shaped mouth with an orifice on its side to admit sufficient water. The auxiliary dredge equipment includes an Allis-Chalmers 4-in. by 3-in. centrifugal pump which supplies water to the hydraulicking jet and to a



The 12-in. centrifugal dredge pump.

Penberthy XL 96 ejector which primes the Amsco unit.

As stated, the sludge is piped directly to the discharge box at the top of the plant. Manhattan rubber couplings are used on the pipe-lines which are supported by wooden pontoons over the pond. At the plant the sludge is dewatered and classified, as described previously, the gravel being stored in five bins in the tipple, each of 1-car-load capacity, and the sand and wash water are flumed to the sand tanks. Each Niagara screen is equipped with washing jets to rinse the gravel thoroughly as it passes over the cloth, the wash water being supplied by a Fairbanks-Morse 4-in. centrifugal pump.

For the production of concrete and masons' sand, two 12-ft. by 24-ft. steel tanks with parabolic-shaped bottoms are used. Each tank is equipped with four discharge valves and two baffle plates to retard the velocity of the water as it flows into them.

Cars are loaded direct from the tipple, there being three yard tracks available for the car movements. Two American 40-ton locomotives handle the switching for the three plants, and an Ohio 1½-cu.yd. locomotive crane is used in loading the cars. The company's tracks extend three miles to the Mobile & Ohio R. R. mainline.

The No. 3 plant was designed by the company and all steel work was fabricated by the Virginia Bridge & Iron Works.

The No. 1 plant of the Montgomery Gravel Co. employs an Amsco 8-in. dredge pump and an 8-in. booster pump of the same make. It is equipped with several gravity screens as well as two Link-Belt 3-deck vibrating screens. At present, the No. 2 plant is not in operation. The normal capacity of 1,500 tons per day at the No. 1 plant together with the production at the new No. 3 plant will give a combined output of 4,500 tons daily.

T. F. Wallace is general manager and J. L. Hanners is general superintendent.

Gypsum Production in 1930 Drops Below Preceding Year

Production of the gypsum industry in 1930 fell below the level for the preceding year, according to a statement made public by the United States Bureau of Mines, based on reports received from 56 operators in 16 states and collected in coöperation with the Geological Surveys of Iowa, Kansas, Michigan, New York, Oklahoma, South Dakota, Texas and Virginia.

The quantity of gypsum mined in the United States in 1930 was 3,471,393 short tons, a decrease of 1,544,739 tons, or 31 per cent., compared with 1929. This production, however, was greater than that of any year prior to 1922 and was more than 10 per cent. larger than that of 1920.

The total value of the calcined and uncalcined gypsum sold by producers was $27,051,484, a decrease of $4,241,485, or 14 per cent. compared with 1929. The quantity of gypsum sold by producers without calcining in 1930 was 989,591 short tons, a decrease of 76,106 tons, or 7 per cent., compared with 1929, and was valued at $1,886,254, or $1.91 per ton, a decrease of $210,525, or 10 per cent., in value and of 6 cents per ton; the quantity of calcined gypsum sold by producers was 2,191,376 tons, a decrease of 1,170,204 tons, or 35 per cent., and was valued at $25,165,230. This was a decrease of 14 per cent. in total value compared with 1929.

New York continues to be the largest producer of gypsum. The production of crude gypsum in that state in 1930 was 912,070 tons, a decrease of 29 per cent. from that of 1929. This was 26 per cent. of the entire quantity mined in the United States. New York is also the largest seller of gypsum, marketing 275,294 tons without calcining, or 28 per cent. of the United States total, and 573,602 tons calcined, or 26 per cent. of the total. These figures represent a decrease of 8 per cent. in the uncalcined and 33 per cent. in the calcined gypsum compared with 1929. Other important states in the production of crude gypsum in 1930 were Michigan, 519,225 tons; Iowa, 481,047 tons; Texas, 359,315 tons; and Ohio, 255,337 tons. These five States reported 73 per cent. of the total production of crude gypsum in 1930.

The importation of gypsum constitutes quite an important factor in the industry. In 1930 eight importers with 13 plants in ten States, namely, California, Connecticut, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Vermont, Virginia and Washington, reported to the Bureau of Mines that they imported 794,970 short tons of crude gypsum, a decrease of 22 per cent. compared with 1929. These importers reported 93,515 tons of gypsum sold uncalcined, valued at $391,150, an increase of 12 per cent. in quantity and 18 per cent. in value compared with 1929. The imported gypsum sold calcined in 1930 amounted to 648,162 tons, valued at $8,211,837, a decrease of 21 per cent. in quantity but an increase of 5 per cent. in value compared with 1929.

Truck-Driver Training Lowers Costs and Increases Business

Reduced operating costs and increased business are reported as results of adequately trained truck drivers in a recent survey of motor-truck-driver training made by the Chicago Safety Council in conjunction with the nation-wide survey of the National Safety Council.

As a result of driver training in Chicago, 11 of the 63 fleets covered reported reduced accidents, 24 reduced operating costs and 24 indicated increases in business as a result of the training.

Fifty-seven per cent. of the fleets and 90 per cent. of the trucks have systematic driver training, the Chicago survey revealed. Seventy-three per cent. of the fleets and 92 per cent. of the trucks are manned by selecting drivers according to prescribed qualifications. Operators of 58 per cent. of the trucks reward good performance, and operators of 96 per cent. of the 7,514 trucks penalize poor performance. Fifty-nine per cent. of the fleets have printed or posted safety rules and 78 per cent. have special accident report forms.

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

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MORTIMER D. WANDELL

President

New York Trap Rock Corp.

New York, N. Y.

Coming Events

June 15-18, 1931. Pittsburgh, Pa. International Cost Conference, National Assn. of Cost Accountants, William Penn Hotel. Stuart C. McLeod, secretary, New York, N. Y.

June 22-26, 1931, Chicago, Ill. Thirty-fourth annual meeting, American Society for Testing Materials. Stevens Hotel. R. E. Hess, asst. secy., 1315 Spruce St., Philadelphia, Pa.

July 9, 1931. St. Louis, Mo. Monthly meeting, St. Louis Quarrymen's Assn., Forest Park Hotel. E. J. McMahon, exec. sec., 4063 Forest Park Blvd., St. Louis, Mo.

Sept. 4, 5, 1931. Fresno, Cal. Regular meeting, California Associated Concrete Pipe Manufacturers, Hotel Fresno. A. A. Clark, secretary, Box 368, Visalia, Cal.

October 12-16, 1931. Chicago, Ill. National Safety Congress. W. H. Cameron, secretary, National Safety Council, 20 N. Wacker Drive, Chicago, Ill.

Jan. 25-26, 1932. Pittsburgh, Pa. Annual convention, National Ready-Mixed Concrete Assn., Wm. Penn Hotel. V. P. Ahearn, executive secretary, Munsey Bldg., Washington, D. C.

Jan. 27-29, 1932. Pittsburgh, Pa. Annual convention, National Sand & Gravel Assn., Wm. Penn Hotel. V. P. Ahearn, secretary, Munsey Bldg., Washington, D. C.

Feb. 3-4, 1932. Washington, D. C. Annual meeting, Sand-Lime Brick Assn. Ellen Knight, sec., 321 N. Hamilton St., Saginaw, Mich.

Feb. 23-26, 1932. Washington, D. C. Annual convention, American Concrete Institute, Wardman Park Hotel. Harvey Whipple, sec., 2970 West Grand Blvd., Detroit, Mich.

Pumpings from the Old Pit

Excerpts from the old files of PIT AND QUARRY *reveal many interesting sidelights on the activities of the pits, quarries and plants of former days. These are printed in this column each issue.*

Fourteen Years Ago

THE Interstate Stone Manufacturers' Assn. with headquarters at Ottawa, O., changed its name to the Ohio Macadam Assn., and moved its headquarters to Columbus, O.

* * *

The Mackinaw Sand & Gravel Co. of Peoria, Ill., increased the capacity of its plant near that city by installing a belt-conveyor system capable of handling 20,000 tons of material per day.

* * *

Burt Bros., Los Angeles concrete pipe manufacturers, erected a sand-and-gravel plant to supply aggregates for the concern's growing business.

* * *

Ten Years Ago

THE state of South Dakota began the erection of a state-owned cement plant at Rapid City, S. D.

* * *

Prosecution of sellers of agstone below legal standards and reduced freight rates were the principal topics of discussion at a meeting of the executive committee of the National Agricultural Limestone Assn. held at Toledo, O.

* * *

The Silica Products Co. of Guion, Ark., began operating its new plant for the production of silica sand. Its capacity was 200 tons per day.

* * *

Net income of the United States Gypsum Co. for 1920 was announced as $2,126,777, nearly double the amount for the preceding year.

* * *

Five Years Ago

NEWLY incorporated concerns in the non-metallic mineral industries included the Haines Bros. Sand & Block Co., Camden, N. J.; Structural Gypsum Corp., Indianapolis, Ind.; The Johnson-Hudson Gravel Co., Carrollton, Mo., and The Krumroy Washed Gravel Co., Cleveland, O.

* * *

The United Fuel & Supply Co., Detroit, operators of sand-and-gravel plants at New Hudson, Utica and Oxford, Mich., changed its corporate name to the C. N. Ray Corp. Officers were C. N. Ray, president; George F. Barr, vice-president and treasurer; Charles H. Ray, secretary, and James F. Donnellon, assistant secretary.

A. B. Farquhar Co., Inc., to Consolidate Factories

The Portable Machinery Co., Clifton, N. J., has been operated as a division of the A. B. Farquhar Co., Ltd., York, Pa., since April 15. Factory and main offices of the Portable Machinery Co., now located at Clifton, will be moved to York about July 1. No change will be made in the management of the Portable Machinery Co., or in its sales and service organization. A perfected line of flat and trough belt conveyors, unloaders, loaders and sectional conveyors will be manufactured. W. W. Wentz is division manager.

New Corporations

SOCIETE ANONYME DES CHAUX ET CIMENTS DES FONTAINES, Paris, France. 1,200,000 francs. Plant to be at Falaises and will produce cement and lime.

VERTIQUE MARBLE CO., 1214 Maccabee Bldg., Detroit, Mich. $100,000. 40,000 sh. n.p.v.

SUMMITVILLE GRAVEL CO., Summitville, Ind. 100 sh. $100.00 p.v. Linfield Myers, Anderson, Ind., R. J. Spencer and David Blumenthal, Marion, Ind., and Samuel Warner of Summitville.

WASHINGTON COUNTY GRAVEL CO., Greenville, Miss.

ALEXANDRIA CULVERT CO., Alexandria, La. $50,000. U. B. Evans, 8th and Scott St., J. C. Raxdale and J. N. Weil. Plant will open in about a month.

SCHMIDT CONCRETE PRODUCTS CO., St. Joseph, Mo. Henry Hesse, 2736 Jule St.

AVONDALE STONE CORP., Chattanooga, Tenn. Charles C. Moore, E. R. Doris and Charles C. Moore, Jr.

PARRY ROCK & SAND CO., West Palm Beach, Fla. T. H. Parry.

ARLINGTON CONCRETE PRODUCTS CO., INC., 109 Hickory St., Arlington Heights, Ill. Paul C. and Alma B. Taege, Frank C. Busse and E. N. Berbexker.

JOHN I. SMITHEY & SON, INC., Tacoma, Wash., have incorporated with a capital stock of $25,000. The incorporators include Carl H. Lumdberg and George A. Smithey.

Rugged Hydrometer Has Metal Tip for Ballast

Specific gravities of fluid materials may be quickly determined by the use of a simple, rugged hydrometer being marketed by Wm. Hiergesell & Sons, New York.

The feature of the hydrometer is its stream-lined tip of silver-like metal, making it easy to handle and clean. The metal tip is inside the glass shell and serves a dual purpose—as ballast and increased durability. Ballast bulbs, glass-seal ridges, necks and knobs are thus eliminated.

The internal metallization of the tip has the peculiar effect of making the tip practically unbreakable, so that striking it against glass or metal containers will not result in breakage.

In fact it requires a hammer blow to break the metallized tip and prying to separate the glass from the shell, hence when broken, neither shattered glass nor the ballast can or will fall away, which is highly desirable when testing certain solutions and liquids.

Personal Mention

W. H. Benduhn has been appointed Pacific Coast representative for the Young Radiator Co., Racine, Wis., in the sale of its products, such as coolers for gasoline, oil and Diesel engines, air compressors, drag-lines, trucks, busses, aeroplanes, oil coolers, logging machinery, railway locomotives, power units and for various services in which liquid cooling is required. His offices are at 664 Mission St., San Francisco, Cal., where complete technical information is on file for ready reference to the Pacific Coast clientele.

A. R. Merrill, 402 First National Bank Bldg., Tampa, Fla., is planning to establish a sand plant at that point.

G. H. Garcelon has been appointed as manager of the control-engineering department of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. Mr. Garcelon succeeds **J. H. Belknap,** who has been transferred to the engineering division of the Pittsburgh district office of the company. The new manager of the control-engineering department entered the employ of Westinghouse upon his graduation from Massachusetts Institute of Technology in 1903, and before his recent appointment was manager of engineering for the company's works at East Springfield, Mass. He is well known for his work in designing small motors.

William L. Hartley, who has been in charge of the foundry sales division of the Link-Belt Co., Chicago, has been appointed Detroit district sales manager, with offices at 5938 Linsdale Avenue, Detroit.

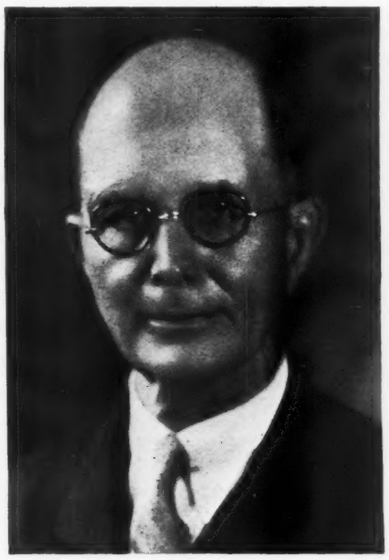
C. F. Herington, for the past nine years in charge of sales engineering and erection of pulverized coal plants for Heyl & Patterson, Inc., Pittsburgh, has opened an office at 1440 Broadway, New York, to specialize in pulverized coal and pneumatic and mechanical handling equipment.

Howard Butt has recently become manager of the engineering and export department, with offices at 50 Church St., New York, of the William Powell Co., of Cincinnati, O., manufacturer of valves and engineering specialties.

Harold H. Perry has resigned as vice-president and director of the Industrial Brownhoist Corp., Cleveland and Bay City, Mich., to become an executive of an Illinois equipment concern.

Edgar J. Kates, consulting engineer and Diesel-engine specialist, announces the removal of his office to 1350 Broadway, New York, N. Y.

T. S. Perkins has been made general manager of merchandising engineering of the new merchandising department of Westinghouse Electric & Manufacturing Co. In this position he will represent S. M. Kintner, assistant



T. S. Perkins.

vice-president, in his work with supply, appliance, refrigeration, and illuminating engineering departments. Previous to this Mr. Perkins was general manager of distribution engineering.

Burrows Sloan was elected chairman of the board, **John R. Sproul** was elected president, **E. A. McKelvy** was elected vice-president and **Roger A. Hitchins** was elected secretary and treasurer at a recent meeting of the board of directors of the General Refractories Co., Philadelphia, Pa. All other officers were reappointed.

In addition to being president and a director of General Refractories, Mr. Sproul is also a director of the Delaware County National Bank, the Lehigh Valley Railroad, the Philadelphia, Baltimore & Washington Railroad Co., and vice-president and director of the Lackawanna & Wyoming Valley Railroad.

Samuel Lindsay, 34, was drowned when a barge being loaded with sand sank in the Potomac River near Oxon, Md., May 23. The barge, owned and operated by the Smoot Sand & Gravel Corp. of Washington, D. C., was used to transport material from the company's dredge to the plant on shore. According to press reports, the dredge was working alongside a steep bank of the river when the bank gave way, causing the barge to sink. Two other workmen on the boat swam to safety.

C. E. Skinner, assistant director of engineering of the Westinghouse Electric & Manufacturing Co., has been appointed as the representative of the American Standards Association on the Council of the International Standards Association.

S. W. Benham, formerly with the Portland Cement Association and Johns-Manville, has been appointed assistant engineer on the staff of the American Standards Association. He will assist in the supervision of civil engineering and transportation projects.

W. S. Brown, who has been Minneapolis Sales Manager for the Universal Gypsum & Lime Co., of Chicago, has been transferred from that point to the Chicago office. He is succeeded in Minneapolis by G. H. Chamberlain, who has been making his headquarters in Milwaukee.

Walter C. Shunk has been named mining engineer by the Goodman Manufacturing Co., with office at the factory, 4834 South Halsted St., Chicago. Mr. Shunk succeeds Sidney W. Farnham, deceased.

Obituary

Horace Adelbert Middaugh, founder of the Pioneer Sand & Gravel Co., died May 25th at his home in Seattle, Wash., at the age of eighty-four. Mr. Middaugh was one of the railroad pioneers, having held executive positions with several early Northwestern railroads. He was in Alaska for a time, where he was superintendent of construction for the White Pass and Yukon Route. He is survived by his widow and one son.

Howard P. Flesher, 41 years old, for some years operator of the Flesher Sand & Gravel Co. at Mt. Vernon, Ind., died recently at Akron, O. Death was due to apoplexy. He was educated in the dental profession but had been associated in business with his father before the latter's death. He is survived by the widow and one son.

A. G. Swanson, aged 53, president of the Omaha Concrete Stone Co., of Omaha, Neb., died recently of heart disease. He was a past president of the Nebraska Concrete Products Association, and a past secretary-treasurer of the National Concrete Products Association.

Traffic News and Comment

Recent I.C.C. Decisions

Crushed Stone. — The commission has awarded reparation on finding that the rate on crushed stone, Middlepoint, O., to Grace Siding, Ind., was unreasonable to the extent it exceeded 73 cents a net ton. I. C. C. Docket No. 24,007, Grace Construction and Supply Co. v. Indiana Service Corp. et al.

Examiners' Reports

Soapstone.—The rate charged on rough soapstone, Joliet, Ill., to Saginaw, Mich., was applicable and not unreasonable and the complaint should be dismissed in the opinion of Examiner Harris Fleming in I. C. C. Docket No. 23,773, United States Graphite Co. v. M. C.

Fourth Section Relief

Cement.—Relief from application of the fourth section has been granted Curlett, Jones and Van Ummersen as requested in their application No. 13,425, on cement in Trunk Line territory and from Trunk Line territory to the 60 per cent group in C. F. A. territory.

Fourth Section Applications

Lime.—J. E. Tilford, Agent, has requested fourth section relief in connection with the establishment of rates on lime from Leeds, N. Birmingham and Phoenixville, Ala., and Watauga, Tenn., to points in southern territory. Appl. No. 14,376.

Amiesite.—B. T. Jones and W. S. Curlett, Agents, have requested fourth section relief in connection with the establishment of rates on crushed stone or slag coated with oil, asphaltum or tar from Shaw Junction, Pa., and Youngstown, O., to points in New York, Pennsylvania and Ohio. Appl. No. 14,380.

Rate Committee Dockets

Trunk Line Assn.

Amiesite.—Shippers at Shainline, Pa., have asked for the publication of rates on crushed stone coated with oil, tar or asphaltum, c.-l. min. wt. Note 1, to stations on the Reading, which are 10 cents per ton higher than the contemporaneous rates on crushed stone. Docket No. 26,963.

Asbestos Sand and Gravel.—Carriers propose a rate of 26½ cents per 100 lb., on asbestos sand and asbestos gravel, in bags or in bulk, c.-l. min. wt. 60,000 lb., from Danville, Warwick, and Sherbrooke, Que., to New York, N. Y., lighterage delivery. Docket No. 26,929.

Lime and Limestone.—Carriers are proposing a rate of 17 cents on building lime, c.-l. min. wt. 30,000 lb., from Alton to Liverpool, N. Y., incl., and 16 cents on agricultural, land, chemical, gas or glass lime, c.-l. min. wt. 30,000 lb., and on ground limestone, c.-l. min. wt. 50,000 lb., from Knickerbocker, Howellville, Rambo, Plymouth Meeting, Blue Bell, Devault, Temple, Billmeyer, Littlestown, Pa., Union Bridge to Frederick, Md., Union Stone Co., Bainbridge, Rheems, Pa., Baltimore stations, Texas, Cockeyville, Md., York stations, Spring Grove, Hanover, Pa., Falling Waters, Berkeley, Martinsburg and Bunker Hill, W. Va. Docket No. 26,426, Sup. 3.

An increase in the minimum weight on lime from 30,000 lb. to 40,000 lb., in connection with rates from Jordanville, N. Y. (Sou. New York Ry.), to stations on the B. & A. R. R., Boston to Brookview, Mass., inclusive. Docket No. 26,895.

Mica Schist.—The addition of Somerton, Pa., as a point of origin taking the same rates on fire stone or mica schist as apply from Glenside and Ardsley, Pa., is proposed by shippers. Docket Nos. 26,982, 26,983, 26,984.

Mica Scrap or Mica Ore.—Carriers propose to publish a rate on mica scrap or mica ore, c.-l. min. wt. 60,000 lb., from Philadelphia, Pa., to Spruce Pine, N. C. of 28 cents per 100 lb. Docket No. 26,643, Sup. 2.

Sand and Gravel.—Carriers propose a rate of 40 cents a net ton on sand and gravel, c.-l. min. wt. Note 1, from Haven, N. Y., to Port Jervis, N. Y., to expire Dec. 31, 1931. The present rate is 60 cents. Docket No. M-1,770.

Central Freight Assn.

Agricultural Limestone.—Carriers propose the establishment of reduced rates on agricultural limestone, c.-l. min. wt. 50 tons, in open top cars to points in Michigan. Representative rates are shown below. Complete exhibit furnished on request. Docket No. 28,543.

To	Present	Proposed
Byron, Mich.	$1.15	$1.12
Carland, Mich.	1.25	1.22
North Star, Mich.	1.35	1.27
Rosebush, Mich.	1.45	1.32
Farwell, Mich.	1.55	1.37
McBain, Mich.	1.65	1.42
Yuma, Mich.	1.75	1.47
Copemish, Mich.	1.85	1.52

Amiesite.—It is proposed to establish rates on crushed stone coated with oil, tar or asphaltum, actual weight to apply, from Marion, O., to destinations in Trunk Line territory based on a rate from Marion to New York of $3.80 per net ton. It is also proposed by shippers that specific rates be published applicable from Marble Cliff, O., the rates to be the same as those applicable from Marion. Docket No. 28,633.

Dolomite.—Shippers at Genoa, Martin and Marblehead are asking for publication of the same rates on dolomite in box cars, c.-l. min. wt. Note 1, as were prescribed by the Commission in I. C. C. Docket No. 21,593 for application from Gibsonburg, O. Copy of proposed rates will be furnished on request. Docket No. 28,563.

Dolomite, Roasted.—Carriers propose to amend agency and individual lines' tariffs naming commodity rates on burnt or roasted dolomite, C. L., between points in C. F. A. territory as described in C. F. A. Tariff 130-T, by providing therein the following restriction: "Rates apply only on limestone, burnt or roasted under such degree of heat that the resultant product is that commercially known as burnt or roasted dolomite. Rates will not apply on limestone burnt or roasted under such degree of heat that resultant product is that commercially known as lime. Docket No. 28,604.

Lime.—Shippers at Painesville, O., have proposed reduced rates on lime (carbonate of, recarbonated waste) in packages or in bulk, c.-l. min. wt. 50,000 lb., as shown below. Docket No. 28,540.

To	Proposed	Present
Columbus, O.	$0.11	$0.185
Ft. Wayne, Ind.	.125	.21
Indianapolis, Ind.	.14	.23
Butler, Pa.	.10	.17
Jeanette, Pa.	.10	.17
Pittsburgh, Pa.	.10	.17
Washington, Pa.	.10	.17
Milwaukee, Wis.	.17	.28
Ashland, O.	.095	.16
Ashtabula, O.	.075	.105
Bedford, O.	.075	.115
Canton, O.	.09	.15
Elyria, O.	.08	.13
Lancaster, O.	.125	.205
Mansfield, O.	.095	.16
Youngstown, O.	.085	.135

Carriers propose to establish rates on refuse lime, when loaded in open top cars, c.-l. min. wt. Note 1, from Milltown, Ind., to destinations in Illinois and Indiana on basis of the so-called Kickapoo mileage scale. Docket No. 28,636.

Sand.—Shippers at Grant, Pa., have asked for the following reduced rates on moulding sand, c.-l. min. wt. Note 1, in Docket No. 28,546:

To	Proposed	Present
Beaver Falls, Pa.	$1.80	$2.80
New Castle, Pa.	1.80	3.10
Youngstown, O.	1.90	3.10
Cleveland, O.	2.25	3.30

Reduced rates on sand, (lake, river and bank), from Miller, Lake Co., Ind., are proposed by shippers as shown below. Docket No. 28,572.

To	Present	Proposed
Kenosha, Wis.	$1.39	$1.03
Lake Forest, Ill.	1.39	.93
Milwaukee, Wis.	1.39	1.23
North Chicago, Ill.	1.38	1.03
Racine, Wis.	1.39	1.23
Rondout, Ill.	1.39	1.03
Waukegan, Ill.	1.38	1.03
West Chicago, Ill.	1.23	.93

Sand and Gravel.—Commodity rates on sand (common) and gravel are proposed by shippers at Worth, Ill., to various destinations. Representative proposed rates are shown below. Classification basis now applies. Docket No. 28,564.

To	Proposed
Crocker, Ind.	$0.80
Magie, Ind.	.85
Pine, Ind.	.90
Lakeville, Ind.	1.05
New Paris, Ind.	1.10
Wolcotville, Ind.	1.20
Stroh, Ind.	1.25
New Haven, Ind.	1.38
Alvordton, O.	1.61
Adrian, Mich.	2.07
Detroit, Mich.	2.30
Wauseon, O.	2.07
Toledo, O.	2.30
South Bend, Ind.	.90

Carriers propose increased rates on common sand and gravel, from Brilliant and Steubenville, O., as follows. Docket No. 28,522.

To	From Brilliant		From Steubenville	
	Prop.	Pres.	Prop.	Pres.
Beaver Road, Pa.	$1.10	$1.00	$1.10	$1.00
Bogga, Pa.	1.10	.90	1.10	.90
Cliff Mine, Pa.	1.10	1.00	1.10	1.00
Hendersonville, Pa.	1.00	.90	1.00	.90
Hyland, Pa.	1.00	.90	1.00	.90
Imperial, Pa.	1.10	.90	1.10	.90
Library, Pa.	1.00	1.00	1.00	1.00
McAdams, Pa.	1.10	.90	1.00	.90
McMurray, Pa.	1.00	.90	1.00	.90
Montour Jct., Pa.	1.20	1.00	1.10	1.00
Muse, Pa.	1.00	.90	1.00	.90
National, Pa.	1.00	.90	1.00	.90
North Star, Pa.	1.10	.90	1.10	.90
Scott, Pa.	1.10	1.00	1.10	1.00
Steubenpike, Pa.	1.10	.90	1.10	.90
Storage, Pa.	1.20	1.00	1.10	1.00

Sand and Gravel.—Carriers propose to reduce the rate on sand and gravel, from Urbana, O., to Jewelles, O., from 60 cents per net ton to 40 cents; this rate to expire November 1st, 1931. Docket No. 28,629.

Soapstone or Talc.—A commodity rate of $4.35 a net ton on soapstone or talc, c.-l. min. wt. 50,000 lb., from Joliet, Ill., to Philadelphia, Pa., is proposed by shippers. The 6th-class rate of 45½ cents on a min. wt. of 36,000 lb. now applies.

Western Trunk Lines

Feldspar.—Shippers propose reduced rates on feldspar, c.-l. min. wt. marked cap. of car but not less than 60,000 lb., from Warroad, Minn., to points in C. F. A. territory. Representative rates are shown below. Complete exhibit will be furnished on request. Docket No. 6,141-E.

To	Present	Proposed
Peru, Ind.	$ 9.10	$7.00
Indianapolis, Ind.	9.60	7.00
Kalamazoo, Mich.	9.20	7.00
Detroit, Mich.	10.00	7.00
Cincinnati, O.	10.10	7.50
Dayton, O.	10.00	7.50
Cleveland, O.	10.30	7.50
Toledo, O.	9.90	7.00

Reduced rates on feldspar, c.-l. min. wt. marked cap. of car but not less than 60,000 lb., to destinations in Minn., Wis., Ill., Ia., and Mo., are proposed by shippers at Warroad, Minn. Representative rates are shown below, per 100 lb. Docket No. 6,141-F.

To	Present	Proposed
Red Wing, Minn.	$0.25	$0.225
Milwaukee, Wis.	.30	.25
Chicago, Ill.	.30	.30
Cedar Rapids, Ia.	.30	.30
Kansas City, Mo.	.585	.325
St. Louis, Mo.	.55	.325

Mica Schist.—Shippers at Boonford, N. C., are proposing a rate on mica schist, c.-l. min. wt. 60,000 lb., to Twin Cities, Minn., of $8.00 per net ton. The present rate is $10.77 per net ton based on the Chicago combination of $6.37 to Chicago and 22 cents beyond. Docket No. 4,506-C.

Sand and Gravel, Coated.—It is proposed to use the present Nebraska sand and gravel scale plus ten cents per net ton in making rates on sand and gravel, coated with asphalt or oil, c.-l. min. wt. Note 1, between points in Nebraska, also between points in Nebraska and points in Iowa, also from from Hawarden, Ia., to points in S. Dakota (east of the Missouri River) or Nebraska. At present there are no specific rates in effect. Docket No. 7,357-A.

Southern Freight Assn.

Feldspar.—It is proposed to publish the same rates on feldspar from Clinchfield and Black Mountain stations to Seville, O., as now apply to Akron, O., viz.: from Erwin, Tenn., $4.81; Minpro, Spruce Pine and Toecane, N. C., $4.93; Bowditch and Cane Branch, N. C., $5.17 per net ton, c.-l. min. wt. 50,000 lb. Docket No. 55,182.

Mica.—Shippers at Franklin, N. C., have requested reduced rate on mica (refuse, not washed or screened, and mica scrap; suitable for grinding purposes only) c.-l. min. wt. 60,000 lb., to Spruce Pine, N. C., and the carriers have suggested a rate of $3.60 per net ton. The present rate is $8.22. Docket No. 55,073.

Soapstone.—Shippers have asked for commodity rates on soapstone and talc, c.-l. min. wt. 50,000 lb., from Alpine and Birmingham, Ala., and the carriers have suggested the following rates: To Cincinnati, O., $3.75; St. Louis, Mo., $4.91; Chicago, Ill., $5.19; Hammond, Ind., $5.19; Detroit, Mich., $5.89; Toledo, O., $5.69; Cleveland, O., $5.79; Rochester, N. Y., $8.66; Sayre, Pa., $8.66, and to Philadelphia, Pa., $7.18 per net ton. Docket No. 55,224.

Southwestern Freight Bureau

Cement.—Shippers at Concrete and Portland, Colo., are proposing rates on cement, c.-l. min. wt. 50,000 lb., to Oklahoma points, based on 8,182 scale, III and IV to scale III and IV territory on the formula presented in such decision, present rates to be cancelled. Shippers call attention to the fact that rates were prescribed in I.C.C. Docket 15,151 from Concrete and Portland to Texas common points based on 8,182 scales III and IV. The same basis is in effect from Kansas Gas Belt and Sugar Creek, Mo., under I.C.C. Docket 14,936 to points in Oklahoma, in S.W.L. Tariffs 14-N and 128-D. The same basis is likewise in effect to Kansas points in W.T.L. Tariff 133-G. In view of the proposed basis being applicable from competing cement producing points, it is thought there should be no objection to extending the scale to these Colorado origins. Docket No. 22,950.

Carriers propose to establish the I. C. C. Docket 8,182 scale III rates on cement, c.-l. min. wt. 50,000 lb., from Ada, Okla., Foreman and Okay Jct., Ariz., to stations in Missouri (in so-called no scale territory) on all lines south and east of the St. L. S. F. Ry. from St. Louis, Mo., to Springfield, Mo. The Commission has issued its report in I.C.C. Docket 17,854 on cement from points in Kansas to points in Missouri and scale III was found to be proper to the Missouri "No Scale" territory, and therefore the carriers suggest scale III rates from the above points to the same destinations. The scale III rates are to-day applicable to Arkansas and Louisiana under I.C.C. Docket 16,845. Docket No. 22,931.

Sand.—Shippers are seeking the establishment of a rate of 14 cents on silica sand as described in item 2806A, S.W.L. Tariff 26-Z, from Ada, Okla., to Santa Anna, Tex. This rate is based on 9 per cent of column 100 rates in I.C.C. Docket 13,535 scale, and is to supply sand for a glass bottle factory which has just been completed at Santa Anna. Docket No. 22,918.

The petitions filed by defendants and complainants in I.C.C. Docket No. 22,771, Falling Springs Lime Co., Inc., v. C. & O. et. al., have been denied except that defendants may make such groups of the destinations involved as will conform with the grouping authorized in the Commission's order of Oct. 27, 1927, in No. 13,494, Southern Class Rate Case.

Proceeding in I.C.C. Docket No. 22,020, Iola Cement Mills Traffic Assn. et al., v. A. T. & S. F. et al., has been reopened for further hearing at such time and place as the Commission may direct, and the order entered Feb. 14th has been postponed until further order of the Commission.

Defendants' petition for reargument before the entire Commission in I.C.C. Docket No. 21,323, Dann-Gerow Co., Inc., et al. v. A. C. L. et al., has been denied.

Questions and Answers

Switching

Q. We have been having some trouble at our plant in getting the train crews to properly spot our cars for loading and unloading. Will you please cite the statutes or decisions of the Commission which require the proper performance of this service?

A. There is apparently no law requiring this service, and the Commission has very definitely stated in 20 I.C.C. 5,658, Imperial Wheel Co. v. St. L. I. M. & S. Ry. Co. et al. that this service is not the duty of the carrier. In this case the Commission said in part, "It is no part of the duty of the carrier, either at common law or under the act, to spot cars at warehouses or factories, or to do more than to set them on the spur track and off their own right of way. The premises here belong to the complainant (industry), and the defendant (carrier) comes upon them for the convenience of the complainant and to serve it without charge and in excess of its legal obligation to serve it." The carrier by spotting cars for one shipper obligates itself to do so for others to avoid discrimination, but is not otherwise required to do this. We would suggest that you register your complaint with the chairman of your Regional Advisory Board as the quickest means of obtaining proper service.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

Income Decline Reported by Consolidated Cement

As the result of generally depressed industrial conditions, the year 1930 recorded a continuance of the decline in consumption of cement in the United States which started in 1929, according to the annual report of John L. Senior, president of the Consolidated Cement Corp., Chicago, Ill. Consumption in 1930 was approximately 6½ per cent. less than in 1929.

The Consolidated Cement Corp. 1930 shipments amounted to 1,735,236 bbl., which is about 10 per cent. under 1929, which with less favorable prices accounts for a loss in net sales of $330,325.98.

Through constant attention to the reduction of cost, notwithstanding reduced output, the corporation succeeded in maintaining a manufacturing cost at approximately the 1929 level.

The summarized profit and loss statement for the year 1930 is given below:

Net sales	$2,406,513.33
Other income (net)	11,105.46
Gross income	$2,417,618.79
Cost of cement sold, selling and administrative expense (exclusive of depreciation and depletion)	*2,034,568.17
Net earnings	$ 383,050.62
Depreciation and depletion	200,815.58
Balance available for interest, amortization, federal taxes, etc.	$ 182,235.04
Annual interest requirements on $3,617,300 first mortgage 6½% bonds	$ 235,124.50
Annual interest requirements on $1,001,000.00 sinking fund 6½ convertible gold notes	65,065.00

*Includes $185,429.18 charged to maintenance.

Raybestos-Manhattan Has Encouraging Prospects

Raybestos-Manhattan, Inc., reports for quarter ended March 31, 1931, net income of $241,203 after depreciation, federal taxes, etc., equivalent to 35 cents a share on 676,012 shares of no-par common stock. This compares with $450,975 or 67 cents a share in first quarter of 1930.

Current assets as of March 31, 1931, amounted to $8,500,788 and current liabilities $732,813 comparing with $10,064,064 and $1,131,639 respectively on March 31, of previous year. The company has declared the regular quarterly dividend of 65 cents, payable June 15 to stock of record May 29.

Holdings of cash and marketable securities as of March 31 totaled $3,164,914. Ratio of current assets to current liabilities was 11.5 to 1.

Sales in May proceeded at a rate 25 per cent in advance of April, which in turn was in excess of the March total. For the first quarter sales were approximately $3,500,000, against $4,815,627 in the like period of 1930. Business has proceeded at an advancing rate so far in the current year, with each month's sales showing an increase over the preceding month.

Freeport Texas Co. Net Is Exceeding Dividend

The dividend of Freeport Texas Co. for the first four months of 1931 was fully earned in that period and the present rate of earnings is in excess of the $3.00 per share annual dividend requirements, E. L. Norton, president, reported to directors at the regular monthly meeting in May.

The increase in the sulphur production tax from 55 cents to 75 cents a ton just voted by the Texas Legislature, instead of the increase to $1.50 a ton originally proposed, will affect the company's 1931 earnings to only a nominal extent, as the law does not become operative until September 1 and during the last four months of the year shipments will be made largely from stocks on which the smaller tax already has been paid.

"While the company's sales this year have been smaller than in the corresponding 1930 period, each month of 1931 has shown an increase over the preceding month, both in sales and earnings," Mr. Norton declared.

"Substantial operating economies have been effected which have not yet been fully reflected in our earnings statements," Mr. Norton stated, "and as soon as general business improves and our sales volume increases, a gratifying increase in our earnings should result."

Satisfactory progress is being made in the development of the manganese deposit in Oriente Province, Cuba, owned by the Cuban American Manganese Corp., in which Freeport Texas Co. recently acquired a controlling interest.

Riverside Cement Omits Its Quarterly Dividend

The Riverside Portland Cement Co. has omitted the quarterly dividend of 15 cents per share, due May 1, on the Class A stock of the company. Decision to defer payment of the dividend at this time was made by the board of directors in order to conserve cash and aid in stabilizing the company's financial structure.

International Salt Co. Pays Regular Dividend

Leonard H. Kinnard, president of the Bell Telephone Co. of Pennsylvania, has been elected a director of International Salt Co. to fill the vacancy caused by the resignation of Miers Bush.

International Salt Co. has declared a regular quarterly dividend of 75 cents on the common, payable July 1 to stock of record June 15.

CURRENT DIVIDENDS

COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE	COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE
Alpha Portland Cement	Common	$0.25 qr.	Apr. 1	Apr. 25	Material Service	Common	$0.50 qr.	May 15	June 1
Bessemer Limestone & Cement	Class A	$0.75 qr.	Apr. 20	May 1	McWilliams Dredging	Common	$0.37½ qr.	May 15	June 1
Calaveras Cement Co.	Preferred	$1.75 qr.	Mar. 31	Apr. 15	Mineral Products	Class B	$0.17½ qr.	Apr. 30	May 1
Canada Cement Co.	Preferred	$1.62½ qr.	May 30	June 20	Pennsylvania Salt	Common	$0.75 qr.	Mar. 31	Apr. 15
Canada Paving & Supply	Preferred	$1.75 qr.	May 15	June 1	Raymond Concrete Pile	Preferred	$0.75 qr.	Apr. 20	May 1
Cleveland Quarries	Common	$0.75 qr.	May 15	June 1	Raymond Concrete Pile	Common	$0.50 qr.	Apr. 20	May 1
Consolidated Rock Products	Preferred	$0.44 qr.	May 15	June 1	Standard Paving & Materials	Preferred	$0.50 qr.	Apr. 23	May 1
Fitzsimons & Connell	Common	$0.50 qr.	May 21	June 1	Standard Paving & Materials	Common	$1.75 qr.	Apr. 30	May 15
General Asphalt	Common	$0.75 qr.	June 1	June 15	Superior Portland Cement	Class A	$0.27½ M	May 23	June 1
Great Lakes Dredge & Dock	Common	$0.25 qr.	May 5	May 15	Texas Gulf Sulphur	Common	$0.75 qr.	June 1	June 15
Kentucky Consolidated Stone	Preferred	$1.75 qr.	Apr. 15	May 1	United States Gypsum	Preferred	$1.75 qr.	June 15	June 30
Lawrence Portland Cement	Common	$1.00 qr.	June 15	June 30	United States Gypsum	Common	$0.40 qr.	June 15	June 30
Lehigh Portland Cement	Preferred	$1.75 qr.	June 13	July 1	Wallace Sandstone	Preferred	$1.50 S.A.	Mar. 30	Apr. 15
Lehigh Portland Cement	Common	$0.25 qr.	Apr. 14	May 1	Worcester Salt	Preferred	$1.50 qr.	May 8	May 15
Lock Joint Pipe	Common	$0.67 M	June 30	June 30					

Review of Foreign Practice

The Admixture of Inert Materials with Clinker

Several months ago Dr. Fernando Parissi, writing in *Le Industrie del Cemento,* attacked the admixture of inert materials with Portland-cement clinker at the time of grinding, on the ground that these admixtures resulted in a lowering of the quality of the cement. Any such diminution of the quality of cement is morally wrong on the part of the producer, because the purchaser receives a product inferior to what he has a right to expect when he buys a product under the name of Portland cement, and may even find its use dangerous.

Before the war such admixtures were not legal, but during the war they were legalized so as to increase the volume of cement available. Cement so produced does not conform to the definition of the present standard specifications, however, and there is grave doubt whether it is now legal. Inasmuch as the Italian cement industry at the present time is seriously overproduced and producers are struggling for their existence, the author believes that the Federazione Nazionale Fascista dei Produttori di Cemento, representing all producers, should force this question to the front, for if the practice could be condemned, it would avoid the swelling of the volume of cement due to the proportion of inert admixtures. The increased volume of cement due to admixtures is blamed in part for the extremely low prices which cement now commands.—G. Scamuzzi, in *Le Industrie del Cemento,* Milan, 27:9-10, Feb., 1931.

Power Costs Reduced by Anti-Friction Bearings

Modern equipment is so far committed to anti-friction bearings that it no longer often happens that the comparative merits of plain and anti-friction bearings are commented on. An interesting example, however, is given by the modernizing of several grinding mills of the Dalmatia cement plant at Sucurac, Jugoslavia, which had originally been built and installed with plain bearings. After being modernized with ball-bearings of the Aktiebolaget Svenska Kullagerfabriken (SKF), the power consumption decreased 15.2 per cent, in addition to other advantages, such as greater safety of operation, continuity of operation, simpler lubrication, and economy of lubricants. The power consumption before the installation of the anti-friction bearings was 3.1445 kw.-hr. per 100 kg. of cement; after modernizing this dropped to 2.666 kw.-hr. —*Cemento,* Barcelona, 3:50-51, Feb., 1931.

Drag Scraper Transports Stone in German Quarry

At the Porta works of the Wickingsche Portland-Cement und Wasserkalkwerke limestone blasted down from the face of a large side-hill quarry was formerly loaded into quarry cars by hand, requiring a crew of 20 men, but hand loading has recently been replaced by the installation of a 1½-cu.m. Demag drag-scraper. The scraper works along the foot of the quarry face, digging its own load of blasted rock, and drags up an incline to load direct into the quarry

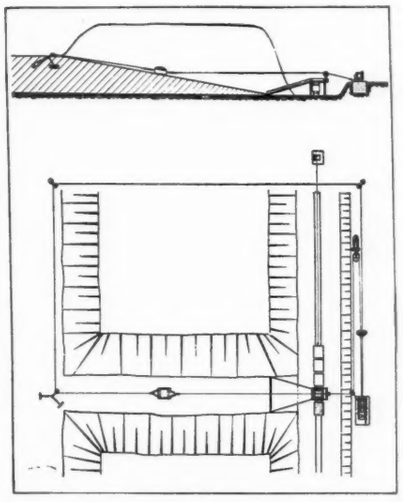


Fig. 1. Lay-out of drag-scraper for loading stone in quarry of Wickingsche Portland-Cement und Wasserkalkwerke.

cars (Fig. 1). At an average haul of 60 m., or about 200 ft., it makes a round trip in about 90 sec., so that it loads a train of 10 cars of 2-cu.m. capacity each in about 20 min. The cost per cubic meter when hand labor was employed was approximately 1.4 marks, and with the scraper (including all capital charges, cables and repairs, labor and power) is only about one-sixth as much, or 0.24 marks (approximately 6 c.).—Dipl.-Ing. C. Berninger in *Tonindustrie-Zeitung,* 55:51-53, Jan. 12, 1931.

Electric Locomotives in German Granite Quarries

The Sachsische Granit Akt.-Ges. of Dresden has been a user of electric locomotives for a number of years, the first having been installed in 1901, and the management has found this method of haulage eminently satisfactory because of ease of operation, great flexibility, speed, rapid changes of direction and economy. About 13 kilometers of track make up the haulage system, including the lines between the plant units, loading docks and quarries. The locomotives are motor-driven and take current from an overhead transmission system through pantographs. Originally the lines were fed with current from the company's own central generating plant, but since 1922 the company has found it better to purchase current.—*Pierres et Minerais* (Brussels) 2:287-8, Dec. 1930.

Recent Studies on the Setting Time of Cement

The effect of storage on Portland cement is in general to make it slower-setting, but as early as 1878 Heintzel showed that, under certain conditions, the time of set may actually be decreased. In the year 1908 an investigation was made of the time of set of all cements tested in the laboratory of the Verein Deutscher Portlandzementfabrikanten, tested on receipt and after 3, 6, 9, and 12 months' storage, respectively. In these tests certain uniformities in the characteristics of all cements and between the different stages of storage were unmistakable; principally, though not without exception, that cements with short or moderate setting periods under the influence of storage prolonged their time of set and the beginning of hardening, while, on the other hand, the setting time and beginning of hardening of the slow cements were speeded up by the action of storage. In all cases cited the beginning and end of the set always changed in the same sense in all tests; if the hardening began earlier, the total period of the setting was also shorter, and if the end of the set was delayed its beginning also set in later.

This article, however, reports a series of setting conditions in which, under certain circumstances, the beginning and end of the set alter in opposite directions. The cements used in the tests were very finely ground, yielded high strengths, and possessed high lime content. The setting times of these cements remained practically constant if stored in some appropriate manner; but if they were exposed in intimate contact with the air, for instance in a layer 20 to 40 mm. thick, the initial set, after a certain length of time, began sooner, but the final set later, than originally. These alterations seem to be dependent in part on the chemical composition of the cement (in particular the lime content), and in part on the action of the carbon dioxide in the air.—Dr. Hellmut Weithase in *Zement,* 20:187-192, Feb. 26, 1931.

Recent Patents

AMERICAN

Burning

Lime-kiln. Embra T. Reed, Elmore, O. No. 1,805,151.

Cement and Concrete

Portland cement and process for producing same. Ellis W. Reed-Lewis, Detroit, Mich., assignor to Super Cement Co. No. 1,805,104.

Concrete-delivery apparatus. Samuel Shafer, Jr., Milwaukee, Wis., assignor to Chain Belt Co., same place. No. 1,805,602.

Excavating

Excavator. Rudolph M. and Bruce L. Bowman, Hollywood, Cal. No. 1,804,587.

Shovel-tooth. Frank Elwood, Carbondale, Ill. No. 1,804,756.

Crawler traction mechanism. Dwight J. Shelton, Marion, O., assignor to Marion Steam Shovel Co., same place. No. 1,804,816.

Shovel-head. William C. Anthony, Charles H. Benedict, and Lester Wachter, Streator, Ill., assignors to Anthony Co., Streator, Ill. No. 1,805,028.

Pull shovel. Paul Burke, Green Bay, Wis., assignor to Northwest Engineering Corp. No. 1,805,479.

Reversible dipper tooth. Van Cortright Merkel, Oak Park, Ill. No. 1,805,527.

Clam-shell bucket. George F. Thompson, Erie, Pa., assignor to G. H. Williams Co., same place. No. 1,805,532.

Convertible excavating attachment. George A. Vaughn, Newton, Ia., assignor to Parsons Co., same place. No. 1,806,511.

Reversible - digging - edge scraper. Edward C. Addison, Camden, N. J., and Warren H. Hill, Philadelphia, Pa., assignors to R. H. Beaumont Co., Philadelphia, Pa. No. 1,806,551.

Miscellaneous

Apparatus for producing aggregates. Harry H. Smith, Massillon, O., assignor to Industrial Silica Corp., Youngstown, O. No. 1,805,020.

Apparatus for grinding the rolls of ore-crushing or like mills. August Voegel, Magdeburg, Germany. No. 1,806,226.

Method for measuring the amount of water contained in most sand or gravel. Tappan Collins, Dormont, Pa. No. 1,806,538.

FOREIGN

Cement and Concrete

Process for handling of gravel concrete. Max Giese and Fritz Hell, Kiel, Germany. German 525,473.

Apparatus for burning cement. Lepol Internationale Patentverwertungs-Gesellschaft m. b. H., Berlin, and N. V. Solopol, Ingenieursbureau tot Exploitatie van het System Polysius, 's Gravenhage, Holland. German 526,451.

Crushing and Grinding

Feeding device for roll crushers. F. Stille, Maschinenfabrik, Muenster, Germany. German 525,358.

Two-roll crusher for reduction of hard substances. Hugo Marmorek, Vienna, Austria. German 525,166.

High-speed hammer mill. Allgemeine Elektricitaets-Gesellschaft, Berlin. German 525,029.

Hammer mill. Deutsche, Babcock & Wilcox Dampfkesselwerke Akt.-Ges., Oberhausen, Germany. German 525,-030.

Tube mill with internal screening. Humboldt - Deutzmotoren Akt. - Ges., Koeln-Kalk, Germany. German 524,-977.

Drive for mill feeder. Allgemeine Elektricitaets-Gesellschaft, Berlin. German 525,137.

Grinding mill. Henry Drysdale and Sidney Smith & Blyth Ltd., London. German 526,268.

Grinding plate for single-roller mills. Hans Hummel, Zurich, Switzerland. German 526,137.

Grinding mill. Emil Barthelmess, Dusseldorf-Oberkassel, Germany. German 525,914 and 525,971 (addition).

Drilling

Drill. Reinhold Koesser and Karl Funk, Leipzig. German 525,395.

Rock drill. Nicolaus Maier and Emilie Tirocke, Hindenburg, Germany. German 525,176.

Compressed-air hammer. Froelich & Kluepfel, Maschinenfabrik, Wuppertal-Barmen, Germany. German 525,083.

Rotary drill bit. The Reed Roller Bit Co., Houston, Tex., assignee of Anthony Emil Carlson, Los Angeles, Calif. Canadian 311,730.

Drying

Drier. Stettiner Chamotte-Fabrik Akt.-Ges., Berlin-Wilmersdorf, Germany. German 525,155.

Apparatus for regulating the quantity of hot gas in rotary dryers. Maschinenfabrik Imperial G. m. b. H., Meissen, Germany. German 525,370.

Process and apparatus for storage and recovery of heat in continuous dryers. Johan Gustaf Olsson, Lidingon, and Frans Ivar Eugen Stenfors, Alsten, Sweden. German 526,455.

***Pit and Quarry** will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

Steam-heated tube dryer. Buttner-Werke Akt.-Ges., Uerdingen a. Rh., Germany. German 525,732.

Gypsum

Acoustical wall. Gypsum, Lime & Alabastine, Canada, Ltd., Paris, Ont., assignee of Harry Melvin Draper, Caledonia, Ont. Canadian 311,700.

Wallboard. Gypsum, Lime & Alabastine, Canada, Ltd., assignee of Victor George Stanton, Paris, Ont. Canadian 311,701.

Kilns

Closing device for rotary kilns. Friedr. Krupp Grusonwerk Akt.-Ges., Magdeburg-Buckau, Germany. German 525,060.

Rotary kiln. Arno Andreas, Munster i. W., Germany. German 526,359.

Regulator for passage through rotary kiln, consisting of pieces hung at appropriate place in the kiln from chains or the like. Arno Andreas, Munster i. W. German 525,825.

Rotary kiln for treatment of cement, ore or the like, in which the cooler forms an integral part of the kiln. G. Polysius Akt.-Ges., Dessau. German 526,011.

Process for affecting the process of cement shaft kilns by introducing water in the burning zone. Vulcan-Feuerung Akt.-Ges., Cologne. German 526,069.

Lime

Process for the production of formed calcium oxide. Aktien-Gesellschaft fuer Stickstoffduenger, Cologne. German 525,272.

Material-Handling

Device for dumping the buckets of pivoted bucket elevators. J. Pohlig Akt.-Ges., Koeln-Zollstock, Germany. German 525,274.

Apparatus for accelerating a shaking conveyor. Hauhinco Maschinenfabrik G. Hausherr, E. Hinselmann & Co., G. m. b. H., Essen, Germany. German 525,275.

Scraper or chain-bucket device for unloading bins. Adolf Bleichert & Co., Akt.-Ges., Leipzig. German 525,277.

Loader for belt conveyor underground. Albert Ilberg, Moerss-Hochstrass, Germany. German 526,274.

Scoop for loading material. Adolf Wolanke, Beuthen, Germany. German 526,275.

Belt conveyor. Tage Georg Nyborg and Mark Frederick Higgins, Worcester, England. German 526,521.

Belt conveyor. Adolf Bleichert & Co., Akt.-Ges., Leipzig. German 526,-522.

Conveyor drive. Clarence Raymond Claghorn, Baltimore, Md. German 526,523.

Iron conveyor chute. F. W. Moll Sohne, Witten, Germany. German 526,816.

Endless cable for conveying purposes. Maxence Isnard, Grenoble, France. German 525,808.

Multiple drive for belt conveyors. Mix & Genest Akt.-Ges., Berlin-Schoneburg. German 525,809.

Shaking conveyor on a set of rollers. Fritz Bergmann, Duisburg, Germany. German 525,810.

Manufacturers' Publications

Each publication listed below contains information of interest to non-metallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Buckets, Clam-shell

Hayward Electric Motor Buckets. 12 p. Illustrated. (Bulletin 700. The Hayward Co., New York, N. Y.) Describes and illustrates a clam-shell bucket of the "hook-on" type operated by a built-in electric motor. Made in sizes up to 3-cu. yd. capacity.

Crushers

Telsmith Wheeling Jaw Crushers. 8 p., 8 ill. (Bulletin 265. Smith Engineering Works, Milwaukee, Wis.) Describes and illustrates the improved Wheeling jaw crusher, the manufacture and distribution of which was recently taken over by this concern.

Dust Collectors

The Oval Bag Dust Arrestor. 4 p., 3 ill. (Bulletin DA-r. Parsons Engineering Corp., Cleveland, O.) Describes and illustrates a dust collector composed of a series of oval tube cloth filtering units in a bag housing.

Electrical Equipment

Small Generator Units and Their Application. 12 p., 24 ill. (Circular 1908. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.) Describes and illustrates four types of generators for supplying electricity where no power line is available. The four types, each of 15 kw. capacity are (1) belt-driven, (2) turbine, (3) gasoline, and (4) gasoline, in parallel with storage batteries and the load.

Excavators

Tractor Shovel and Cranemobile. 24 p. Illustrated. (Catalogue T-7. Bay City Shovels, Inc., Bay City, Mich.) Describes and illustrates a crawler-mounted convertible tractor shovel and a rubber tire-mounted truck crane. Specifications and working-range diagrams are included.

General Excavators. 20 p. Illustrated. (Bulletin 3105. The General Excavator Co., Marion, O.) A new booklet describing the shovel, backhoe, clam-shell, drag-line, backfiller, skimmer and crane made by this concern.

Materials Handling

Monarch Material Handling Equipment. (Catalogue GG 131. Sprout, Waldron & Co., Inc., Muncy, Pa.) A loose-leaf catalogue of approximately 300 pages describing and illustrating a complete line of materials-handling machinery and equipment.

Pipe Fittings

Dieform Compression Fittings. 16 p. Illustrated. (Bulletin 13. Bailey Meter Co., Cleveland, O.) Describes and illustrates the application, advantages and installation of compression fittings used with copper, or steel tubing on small service lines.

Power Transmission

A Saving at Every Turn. 16 p. Illustrated. (Book 1293. Link-Belt Co., Chicago, Ill.) Describes and illustrates chain drives, gears and speed reducers for application in every phase of industrial power transmission.

Pumps, Centrifugal

Centrifugal Pumps, Single-Stage Volute. 4 p. Illustrated. (Bulletin W-312-S8. Worthington Pump & Machinery Corp., Harrison, N. J.) Contains descriptions of single-stage white centrifugal pumps in sizes from 14 to 36-in.

Speed Reducers

IXL Worm Gear Speed Reducers. 80 p. Illustrated. (Catalogue 301. Foote Bros. Gear & Machine Co., Chicago, Ill.) Describes and illustrates in a complete manner worm gearing and worm-gear speed reducers. Contains a preface on the evolution of worm gearing, tracing its use from the earliest applications to its modern development.

Welding

"The Welding of Alloys." 6 p., 8 ill. (*Oxy-Acetylene Tips* for April, 1931. The Linde Air Products Co., New York, N. Y.) An interesting and instructive article on the welding of ferrous and non-ferrous metals.

Fire Prevention and Control Topics for July Safety Meeting

By W. DEAN KEEFER
Director, Industrial Safety, National Safety Council

PRACTICALLY every industrial plant has fire hazards, and the control of these hazards is closely related to the control of the accident hazards of the plant.

The fire hazards of your plant will depend of course on the location and the activities. But it is safe to say that there will be important fire hazards in every unit of your plant no matter where located. Even in an isolated quarry or pit, there usually are important fire hazards, such as, the oil- and gasoline-storage tanks or storage rooms, the supply shed or supply rooms, temporary wood buildings or buildings in course of construction, and assembled materials for different uses.

At the established headquarters of your plant there certainly will be enough fire hazards of sufficient importance to justify a special safety program.

It might be a good plan, in your special program devoted to "Fire Prevention and Fire Extinguishment" to ask the fire chief in your town or the man in charge of your own fire-fighting equipment to prepare a special talk.

If the chief speaker for this meeting desires special information he is invited to write to the National Safety Council to get one or more of the following safe practices pamphlets: "Fire Causes and Prevention"; "Fire Extinguishment"; "Exits, Fire Alarms and Fire Drills"; "Fire Brigades."

We would suggest as the chief subdivision of his subject that he discuss (1) Some causes of fire, including:

(a) Refuse.
(b) Electricity.
(c) Apparatus.
(d) Flammable Materials.

As another sub-division he might discuss (2) Proper action after a fire is discovered, including:

(a) Sounding the alarm and notifying the fire department.
(b) Proper exits for employees.
(c) Use and maintenance of local extinguishment apparatus.

At the conclusion of his talk the meeting should be thrown open for a short discussion of the speech, to enable the members of your safety committee and others in attendance to ask questions and to clear up any points about which there is any doubt.

The chairman of your meeting should arrange in advance for an exhibit at this meeting of the different types of extinguishment devices which are being used or should be used in your plant. There doubtless will be at least two or three different types of extinguishers and these should be explained and discussed by the men who are responsible for their maintenance. These men should explain briefly the use and care of the extinguisher, and using the proper extinguisher on a certain type of fire.

It may then be advisable to capitalize the enthusiasm of the meeting by appointing a sub-committee to inspect the entire fire fighting organization of your plant and all fire equipment.

The report of the special committee appointed for the fire inspection of your plant could be made an interesting feature for your next plant safety meeting, or for a special meeting.

Especial attention to the fire hazards of your plant, and the development of a proper organization to watch these hazards, should be of special value in stimulating a continuous interest in your related plant program of accident prevention.

Insurance Problems Discussed

Insurance Policy Forms Are Constantly Changing

THE insurance business is on the move. It is changing constantly and rapidly. Largely because of the more complex needs of modern industry, even the old standard policy forms, which have been well set through generations of court interpretations, are being altered to meet present conditions. All of the changes, of course, are in the direction of broadening the policy. Legal technicalities are disappearing, as they should, and policies seem to be approaching the ideal of being "simple promises to pay" in case of an accident.

Changes in the various policies of casualty insurance are well known. In all this changing, workmen's compensation insurance seems to be the one branch that suffers from dissatisfaction. True enough, the changes are broadening. At practically every session of every state legislature in the United States the benefits payable to injured employes are liberalized. The changes are regularly opposed by the manufacturers' associations, but the political strength of labor is usually sufficient to stifle opposition.

Automobile Changes

The automobile insurance field has undergone some striking alterations in the past two years, all of which have been in favor of the policy holders at practically no increase in rate. The coverage of the expense of towing your car to a service station in case of accidental breakdown and for glass breakage add a convenience and peace of mind even greater than their intrinsic value. On the liability phase of automobile insurance the standard limit of protection against claims by others for damage done by you to their property (usually called "property damage") has been raised from $1,000 to $5,000, while at the same time the rates have actually been reduced.

Inflexible Forms

The standard policies of property insurance have been surprisingly inflexible through most of history. The original contracts for fire, wind, explosion and other property lines remained practically unchanged for fifty years. If conditions at your home or factory were such that you needed special treatment to cover your needs without any loop-hole, you actually could not get what you needed. If you had a fire insurance policy and thought you needed protection against explosions, you could not get a blanket policy for everything. But rather as weaknesses in the fire insurance contract developed, we bought separate policies to cover newer risks; the separate policies were disjointed and there might easily be points where they did not fit and where the property owner might fail to collect his loss under any one because of technicalities.

The first major change in property insurance came in 1925. The worst troubles of insurance men had always lain in the "joker" of the fire policy which says that "should any part of the building fall, all fire insurance is immediately void." It was serious because often in cases of combined fire and wind damage it was impossible to collect a loss in full even though carrying both kinds of protection. This technicality, probably the worst we ever had, was finally eliminated by adding a clause in the windstorm policy to "bridge the gap."

Trend in Fire Policies

The past two years have seen many liberal additions to fire insurance. Changes for the benefit of the policy holder are proceeding along at least four different lines.

The latest change, and the most important in that it affects the largest number of policy holders, is a new supplemental contract which gives virtually blanket insurance against all risks on residential and mercantile property. Under the new form, instead of holding separate, unconnected policies for every risk that you insure, you can have an endorsement attached to your fire insurance policy extending it to cover loss or damage caused by aircraft, explosion, hail, motor vehicles, riot and windstorm. Losses resulting from a combination of these causes are also covered; so it is no longer possible for an insured to be left high and dry between the terms of conflicting policies. The risks included in this contract, together with the basic fire policy, are about all that a building is normally exposed to, and the contract therefore gives practically complete protection. An attractive feature of the new form is that it does not cost any more than the old rate for windstorm insurance alone. This so-called "supplemental contract" is the newest feature on the insurance market, and we call it to your attention promptly so that you may be informed as it develops. It has been adopted first in the East and in Indiana and Ohio. It has just been approved for use in the rest of the middle west. In the very near future it will be extended to cover the entire country and all classes of property because it fits a real need for broad protection without technicalities.

Industrial Changes

The two developments in policy form which affect industry most directly are insurance on machinery and on sprinklered factories. Machinery in the open, such as road-building and quarry equipment, is now protected by the marine insurance companies against practically any accident except wear and tear. Factories with automatic sprinkler systems are now granted, in most states, a combined coverage against fire, wind, hail and sprinkler leakage that is broader than anything you will find in the old rule books.

Cigaret Burns

The fourth distinctive change is in the attitude of loss adjusters toward border line fire losses, notably cigaret burns. From the purely legal standpoint, if a cigaret blackens a table top, or if an electric light bulb scorches a curtain or coat, damage is scorch, not fire, and the insurance companies ordinarily used to refuse such claims. Today it is nearly impossible for an adjuster to deny liability in such cases. Underwriters regret this broadening of interpretation because they are not able to raise their rates to cover it. But from the practical standpoint you can feel that the fire insurance policy has definitely been liberalized to cover losses from cigarets, electric irons and lights, regardless of whether there is any actual fire.

Plan to Abandon Railway Opposed by Gravel Firm

The Western Indiana Gravel Co. of Lafayette, Ind., is opposing the petition of the Indiana Railroad which seeks abandonment of its Tipton-Alexandria electric traction line. The gravel company, which operates plants at Dundee and Elwood, along the right-of-way of the line, in its claim filed with the Indiana Public Service Commission points out that it has an investment of $135,000 in its operations which will be seriously endangered if its rail outlet is abandoned.

Three Railroads Ask Cut in Nebraska Sand Rates

The Chicago, Burlington & Quincy, the Chicago & North Western and the Missouri Pacific railroads have asked authority of the Nebraska Railway Commission to reduce rates on gravel and sand from more than a hundred points in the state, the cuts ranging from 25 to 40 per cent. The companies state that this is necessary to meet truck competition, which has been getting 75 per cent of the total hauls on state-highway construction work.

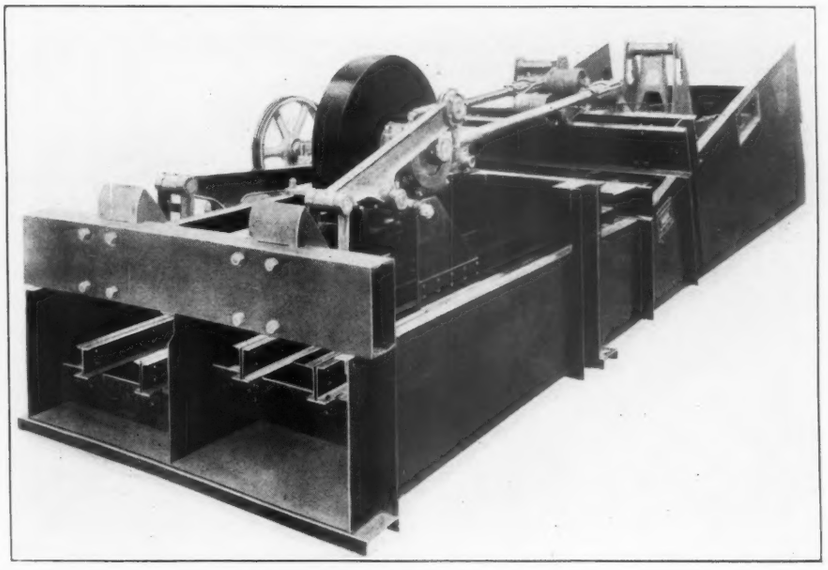
New Machinery and Supplies

New Classifier Designed for Use at High Speeds

The Dorr Co., Inc., New York, has introduced for general classification service a new and improved type of mechanical classifier, known as the Dorr F classifier. The mechanical improvements in the design and the use of an entirely new and advanced type of head motion have greatly extended its field of application, and permitted the use of higher speeds than formerly possible. The use, where possible, of these higher speeds has been accompanied by a corresponding increase in sand raking and overflow capacities where these high rake speeds are consistent with the separation desired.

The new classifier was developed and perfected in anticipation of changes in grinding and classification practice which have now materialized. The motivating influences in this instance were two-fold, first, the definite tendency towards the maintenance of larger circulating sand loads in connection with closed-circuit grinding, and second, the trend towards coarser separations at the primary classification stage in multiple-stage, fine grinding. Both of these objectives are attained in the Dorr F classifier.

The outstanding feature of this improved classifier is a distinctly different type of head motion which is responsible for the machine's ability to operate smoothly and quietly at speeds 50 per cent. greater than the maximum possible previously. All working parts are constructed of cast steel with a liberal use of pressure-lubricated bearings of the ball or roller type. Heavy welded construction is used throughout on the steel tank and on the reciprocating rake assemblies.

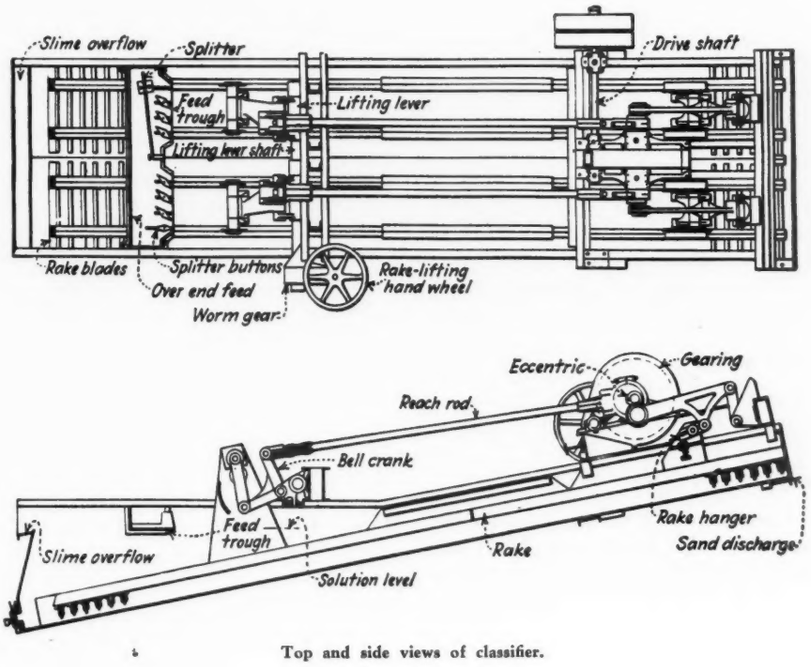


The new high-speed mechanical classifier.

The improved head motion adopted has permitted a material reduction in the head room required, giving the Classifier a pronounced underslung, compact appearance. Speeds up to 50 strokes per minute are now permissible, and both sand raking and overflow capacities have been increased. Simplification of design has reduced moving parts 22½ per cent., regularly-lubricated parts 33 per cent., and infrequently-lubricated parts 50 per cent.

The Dorr F classifier has been in process of development for three years. Prior to its introduction on a marketing basis a unit was subjected to a concentrated test program at the factory and since then a machine of this type has been in continuous operation for one year at the Nevada Consolidated Copper Co., McGill, Nev. Twenty additional machines are now in use or on order in the cement, sand-and-gravel, copper, gold, and coal fields.

The classifier is offered with and without the bowl for all separations from 10 to 325 mesh. The widths range from 3 ft. to 16 ft., lengths vary according to the specifications of the mills with which the classifiers are to operate in closed circuit, and the raking mechanisms are furnished in the simplex, duplex and quadruplex types.



Top and side views of classifier.

Builds Hammerhead Boom for Steel-Erection Jobs

The Northwest Engineering Co., builders of gasoline, electric and oil-powered shovels, cranes and draglines, has developed a hammer-head boom for steel-erection purposes.

While this type of boom has been used on locomotive cranes in the past, it is believed that this is the first time it has ever been applied to a crawler.

The hammer-head boom is provided with sheaves for a five-part line and is designed to keep the load away from the boom structure.

Adds Many Refinements to Concrete-Mix Trucks

The rapid march of progress in the ready-mixed concrete industry together with new methods of handling concrete, new methods of selling the mixed batch and new methods of financing concrete factories has played an important part in the design of Rex Moto-Mixers. Believing that the equipment designed today for dry plants, wet plants, or shrinkage plants must be planned to pay its way profitably for the next several years, Rex engineers have taken obsolescence seriously into consideration.

For more than 25 years the Chain Belt Co. has manufactured construction equipment. Equipment furnished for ready-mixed concrete plants is

Water tank and control apparatus with mixer motor and drive.

planned for years ahead in all phases of the construction equipment business. The man or men buying a truck mixer today, or contemplating the purchase or the erection of a central-mixing plant or dry plant for ready-mixed concrete, must think in terms of profits on his investments during a period of years. Equipment today in this rapidly progressing business, unless designed properly may be obsolete within a year. Since manufacturing processes cannot be changed over night Chain Belt engineers set out to plan for the future and built equipment for plants that should take care of future change and advancement wherever possible.

Much has been done in the development of the Rex Moto-Mixer. The design is made in anticipation of the needs and requirements of the years to come with the idea that the equipment should earn a profit for the contractor next year and the next as well as the present year. The truck mixers and allied equipment should not be obsolete and a loss on the contractor's hands at the end of the first year. With this in mind Rex engineers have made a careful study of the Rex fleets in operation during the last three years and have made a careful study of the ready-mixed concrete business as a whole.

The first Rex truck mixers went into action early in 1927 although for years previous they were operating on actual jobs under severe tests. This first truck mixer, known as the Mixhaul, was designed with separate power units which is the common practice today instead of securing power for the mixer from the truck motor itself. A year later the Rex Moto-Mixer came into the picture with refinements that resulted from the study the engineers had made up to that time. Now additional refinements have been made.

Water has received a great deal of attention by the designers of Moto-Mixers. Every precaution was taken to see that the water control mechanism be as accurate and as fool-proof as possible. The water control apparatus was made to pass the strictest inspection of architects and engineers. Once the control is set for the right amount of water the system remains accurate.

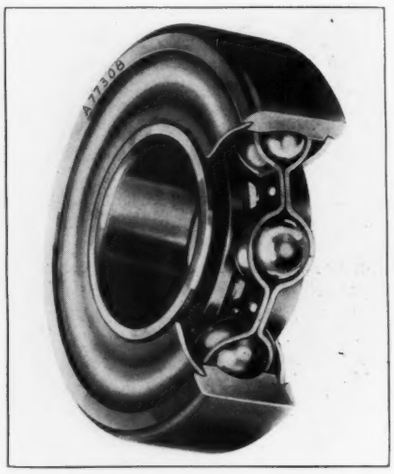
A new controlled discharge has been developed that makes discharging easy. The operator can direct the flow of concrete at will. At the single turn of a handwheel the concrete can be rushed out at full speed or turned down to a mere trickle. A new spout is also used to help place the mixed concrete at a greater efficiency into forms. The discharge is made much higher than one would expect. Allowance has been made so that the mixed batch can be discharged into various forms or on various jobs at a greater range.

One of the most recent improvements on the Rex Moto-Mixers is the method by which the entire batch can be discharged regardless of the angle of the truck which has delivered the mixed batch to the job. Conditions in and around contracting jobs do not always permit unloading a truck at a level or even a slight incline. The Moto-Mixer was engineered to discharge the mixed concrete even though the incline is exceedingly steep. The Moto-Mixer is lighter and lower than any of its previous models. It has a separate mounting. The reduction gears are of heat treated steel and are enclosed in a bell housing and operate in a constant bath of oil. The mixer itself can be mounted on any type of truck or trailer.

The new controlled discharge.

Improved Ball Bearings Used in Electric Motor

The Howell Electric Motors Co. announces a new double-sealed ball bearing as the standard anti-friction bearing on all Red Band motors. The balls and ball race-way of this bearing are packed in a high-quality con-



The new double-sealed ball bearing.

gealed oil and completely sealed in a dust-proof room at the point of manufacture. This eliminates all possibility of dust, dirt or other injurious abrasives entering the interior of the bearing in the process of manufacture.

The seal which consists of two plates—one on each side—prevents dust, dirt, residue from grease or any injurious foreign material from entering the race-way in operation. It makes a motor bearing which runs free at all times because of the lack of channelling of grease and eliminates excessive pressures caused by over greasing.

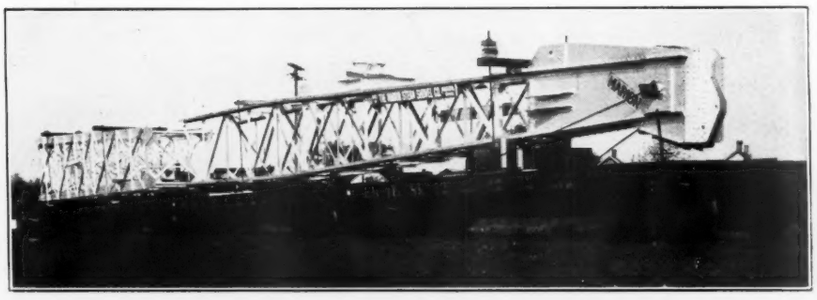
As this bearing needs lubrication it automatically uses only the fine oily part of the grease in the outside-bearing chamber, or the upper-bearing chamber in case it is a vertical motor. The inside bearing chambers on the horizontal motors or the lower bearing chambers on the vertical motors contain no grease which can be forced into the motor.

The bearing cartridge unit lends itself readily to assembly. When repairs require that the bearing be taken out of the housing, the fact that it is totally enclosed makes it easy to handle and prevents dirt from entering.

Light Alloy Drag-line Boom for Use on River

This year the government program in connection with flood prevention work on the Mississippi River is larger than ever before. The yardage to be moved is so great and the work so competitive that new ideas in excavating equipment and methods are being devised in order to secure improved performance at lower cost.

The Marion Steam Shovel Company of Marion, Ohio, has just shipped to one of the large Mississippi contractors, the McWilliams Dredging Co., of Chicago, Illinois, an aluminum alloy boom for use on one of its Marion Type 5241 giant dragline excavators—the first ever built for a large dragline. Aluminum alloy, which weighs about one-third as much as steel, permits this boom to be built with a weight less than one-half that of a steel boom of equivalent length and strength.



The first large aluminum-alloy dragline-excavator boom loaded on flat cars for shipment.

On certain of the Mississippi River work the question of the working weight of the excavator is of prime importance. For such work the excavator with an aluminum alloy boom of a given length and bucket capacity can be built with a working weight much less than with all steel construction. This allows the excavator to be used where the floor or footing is so unstable as to preclude the use of a machine of all steel construction.

In other parts of the work the range or reach of the excavator is the principal factor. Here the excavator with aluminum alloy boom can be built of a given working weight and bucket capacity, but with much greater range than with a boom of all steel construction. The necessity for rehandling of material is thereby lessened considerably.

In still other portions of the work the yardage capacity of the excavator is of greater importance than either of the above. In this case the excavator with aluminum alloy boom can be built with the same working weight and range as one with the steel boom, but having much larger bucket capacity and therefore capable of greater yardage without any increase in the gross power or labor expense.

The weight of the steel boom is such that for ease in handling, shipping and assembling in the field, it must be made in three sections, while the aluminum boom can be made in two.

Bucket Carrier Employs Efficient Type of Chain

The Peck carrier, manufactured by Link-Belt Co., consists of a continuous series of overlapping buckets, pivotally suspended between two endless chains, and well adapted to handling coarse and gritty materials vertically, horizontally or in other directions in the same plane of travel, with provision for discharge at any desired point on any horizontal run.

The buckets have overlapping lips to avoid dropping material between them, and the lips are of an inverted-V shape, to prevent carrying material along and spilling it at the turns.

In the Peck carrier the buckets hang from rods carried by extensions of the inner side bars of the chains beyond the chain joints. The result is that, as the chains pass around the corner wheels, the buckets travel in a larger circle than the chains. They are thus automatically separated at the turns, and the lap and unlap of the bucket lips take care of themselves, without necessity for a reversing mechanism, or danger of spilling any of the load.

The material is *carried*, not dragged, and the buckets are supported by self-oiling rollers, eliminating destructive friction, and reducing to a minimum the power required for operation.

The buckets maintain their carrying position by gravity; hence a single carrier can transport the material in different directions in the same vertical plane, thus eliminating transfers from one conveyor or elevator to another, with their liability of trouble at transfer points, or of using up valuable space or necessitating deep pits.

The through rods from which the buckets are suspended, prevent tipping of the chains, or uneven wear of rollers or rails, or binding of buckets which occurs when hung on pivots.

The buckets are one-piece malleable castings, smooth and of uniform pitch. The chains are of malleable iron or Promal metal, resisting corrosion better than steel, and provided with wider seat for bushings and pins than bar steel would furnish without useless weight in the body of the link.

The chain joint is a most essential feature. The bushings are forced into and held securely as integral parts of the inner side bars; the pins in the outer side bars. All movement in the chain joints takes place between the pins and bushings, which afford long bearing surfaces, smooth and hard for durability, and readily renewable. No wear comes on the links themselves, to destroy them or impair their strength.

The rollers turn on the bushings, which are case-hardened on both outer and inner surfaces, and the enclosed-oiling construction of the rollers is such that the oil is fed slowly and uniformly to the surfaces to be lubricated.

The sprocket wheels in the carrier engage with the chain rollers, and are of the Flint-Rim type, made of a special grade of iron, cast in chills.

With chains of long pitch, the acting diameters of the polygonal sprocket wheels are constantly changing to such an extent as to impart pulsating or jerky motions to the chains, by the succession of accelerations and retardations, if driven by circular gears. This greatly increases the strains in ordinary equipment, but this effect is counteracted by using special "Equalizing gears," which are furnished as standard equipment for the head shafts of Peck carriers.

The motor and driving machinery are supported on substantial self-contained cast iron stands, which form a unit, and allow the shafts to be properly lined up, and gears to be set in proper mesh before they leave the shop. Only two supports are required in the field.

The power required is very low, on account of large enclosed-oiling carrying rollers, well oiled chain joints, and slow speed. There is no vibration, and operation is silent. The carrier will always show the smallest cost of operation, maintenance, attention or repairs; and in view of its long life, and standardized construction and manufacture, it is much more economical, in the course of years, than combinations of other types of elevating and conveying equipment, with their varied driving units, transfers, troughing, gates, costly supports, erection expenses, engineering, etc.

Hitchcock Co. Changes Name and Moves Offices

At a stockholders' meeting held May 25th it was voted to change the name of The Hitchcock Company, Inc., to Convulc Rubber Co., and to move the general office from Boston to the plant at Norfolk Downs, Mass. The officers will remain the same, and are as follows: Edward H. Best, president and treasurer; P. N. Sylvester, vice-president in charge of operations.

Legal Information for Operators

Quarry Driller Entitled to Payment for Injuries

If the testimony discloses that an injury results from negligence of the employer, the employee is entitled to damages.

For example, in Western Co. v. State, 284 Pac. 304, it was disclosed that a workman was employed to operate a drill in a quarry. He was paid 75 cents per foot for each hole drilled. The employer furnished the machinery and equipment. One helper was necessary and was employed by the employer and paid by him, but his pay was deducted from the 75 cents per foot. The employer did not direct the employee as to his hours of work, when he should commence, or when he should quit. While the employer was moving the machinery from one location to another the driller was injured.

In holding the employee entitled to compensation, the Court said:

"The employee was under the direction of the company (employer) as to when and where to move the machinery; that is, when a hole had been drilled to the depth required by the company, the company's foreman directed where the machinery should be moved to next. And it was in this particular work that the employee was injured. . . . We think it is immaterial whether claimant was paid by the hour, day, or by the foot for his work."

When "Interested" Party May File Suit on Bond

It is well known that a party not "interested" in a contract cannot file suit on it. Also, when a contract is designed solely for the benefit of the parties thereto, third persons cannot maintain an action thereon, even though such third persons might derive some incidental or consequential benefit from its enforcement.

The formal parties to a contract, however, are not always the only persons who have an enforceable interest in its performance. There is no good reason why a person may not maintain an action upon a contract, though not a formal party to it, when the contracting parties intend that he may do so. Where, therefore, it is manifest from the nature or terms of a contract that the formal parties thereto intended its provisions to be for the benefit of a third party, as well as for the benefit of the formal parties themselves, the benefit to such third party being the direct and primary object of the contract, such third party may maintain an action on the contract even though he be a stranger to the consideration.

For instance, in American Surety Co. v. Jacksonville Marble & Tile Co., 130 So. 440, it was held that a material man may sue and recover on a bond given by a building contractor and conditioned that the contractor should make payment to all persons supplying materials and used in the construction work.

In this case a contractor furnished a bond which provided that the contractor should "promptly make payments to all persons supplying labor and material in the prosecution of the work provided for in the contract."

A marble company supplied material which the contractor used in the construction of the building. Later the contractor failed to make payment and the marble company sued the bonding company. The counsel for the latter company contended that the marble company was not an "interested" party. However, the Court held the marble company entitled to file the suit, saying:

"The bond is a good common-law bond, and must be construed and enforced accordingly."

Railroad Not Compelled to Spot Cars at Quarry

Generally speaking, the duty of the railroad as a carrier of freight is confined to taking up or setting down freight along its route, or, more exactly, beside its track as constructed. Usually, it can not be compelled to perform the shunting service over the private spur of a shipper, as it can not be compelled to haul beyond its own rails. On the other hand, if it undertakes such service generally it must apparently perform the service for all shippers indifferently at reasonable rates.

Where a railroad company furnishes sufficient facilities of its own, for the receipt and delivery of freight, there is at common law no duty resting upon it to receive or deliver freight upon a private siding or spur track. Moreover, a contract made between a railway company and an industrial company which owns a switch, by the terms of which the railway company agrees to supply cars on the switch, does not bind the former with respect to a purchaser of the switch.

For example, in Milford Quarry & Construction Co. v. Boston & M. R. R., 151 Atl. 336, it was disclosed that the Lovejoy Granite Co. entered into a contract with a railway company whereby the latter placed cars on the former's switch for loading stone and granite. The Milford Quarry & Construction Co. purchased the quarry from the Lovejoy company and litigation developed when the railway company refused to place cars on the switch. The Milford company filed suit, contending that the railway company was discriminatory, but the Court held that, under the circumstances, the refusal was not discrimination. The Court said:

"Receiving and delivering freight upon such spur track is, therefore, purely a matter of contract, to which either party may attach any condition desired. . . . There is absolutely no evidence whatever in the present case of a general undertaking on the part of the defendant (railway company) to perform switching service on a shipper's premises unless the shipper has entered into the customary side track agreement. The plaintiff (Milford company) did not succeed to the rights of the Lovejoy Company under that company's agreement, nor did it enter into any written contract with the defendant on its own behalf."

Demand Upon Owner for Payment Is Enforceable

A common question is presented when the original contractor gives a material man an order on the owner for money due for material and labor and the owner unconditionally accepts such order: Is the material man the legal owner of the money? Under ordinary circumstances the material man may collect the money from the owner. On the other hand, it is settled that the mere promise of the owner to pay the material man does not constitute a valid contract because the presumption of law is that the new promise is equivalent to legal payment only when payment actually is made. Also, such orders are not valid when given after material is supplied for the job.

For example, in Standard v. Aird, 129 So. 285, it was disclosed that a person held a mortgage on property and, after the owner entered into a contract with a contractor for the construction of a building on the property, the holder of the mortgage instituted suit to foreclose his mortgage. Various subcontractors and material men filed liens on the property. Previously, the general contractor had given written orders demanding the owner to pay certain amounts of money to another person. Since the order of payment was given by the general contractor to the owner after commencement of the work by the other subcontractors and material men, the Court held the latter entitled to liens.

Review of Recent Books

ADVERTISING, ITS ECONOMICS, PHILOSOPHY AND TECHNIQUE, *by Herbert W. Fess, Ph. D. J. B. Lippincott Co., Philadelphia, Pa.* Price $5. This volume of 516 pages, 92 illustrations and 5 color plates tells, in a practical, easy-to-understand way, facts about how to plan advertising so that it will create appeal and produce the maximum result. The author is head of the merchandizing department in the Wharton School of Finance and Commerce, University of Pennsylvania, and has had a long career in selling money-making ideas.

Any producer of commercial products would do well to read this new book, the scope of which extends from the psychological aspects of the ad reader through typography, art work, color effects, layouts, illustrations, and paper. It explains, scientifically, the basis for an efficient advertising campaign. It is filled with advice for the manufacturer whose money is being spent for publicity either by himself or through an agency.

CHEMISTRY OF ENGINEERING MATERIALS, *by Robert B. Leighou, professor of chemistry, Carnegie Institute of Technology. McGraw-Hill Book Co., New York, N. Y.* Price $4.50. In the third and revised edition recently published this illustrated book of 684 pages, discusses the chemical properties of engineering materials from the viewpoint of the user. While it does not attempt to explain the details of manufacture, it goes sufficiently into such technic to enable the reader to understand the practical application of the chemical reactions involved so that he will further understand what materials may be best utilized in the processes. The book has twenty chapters including the following headings which are of special interest in the pit and quarry industries: Water for Steam Generation, Fuels, Refractory Materials for Furnace Linings, Foundry Sands, Lime and Gypsum Products, Portland and Other Cements, Clay and Clay Products, Paints, Lubricants, Electrical Insulation Materials, Electric Cells, Corrosion of Iron and Steel. It should be borne in mind that the book is so written as to prove a reference book for both the user of the raw materials and the user of the products.

ELEMENTARY ECONOMIC GEOLOGY, *by Heinrich Ries, professor of geology, Cornell University. John Wiley & Sons, Inc., New York, N. Y.* Price $3.75. This book is written to serve as a textbook or a valuable reference for engineers. It sticks closely to the economic aspects which are separated into the non-metallics and ore deposits. The first list is discussed in 185 pages which cover coals, petroleum, natural gas, building stones, clay, limes, calcareous cements, salines, gypsum, fertilizer minerals, abrasives, asbestos, fullers' earth, graphite, lithographic stone, magnesite, mica, paint minerals, monazite, and precious stones. This volume is a condensation of a much larger and more comprehensive textbook by the same author, one of America's recognized authorities in geological matters.

ELEMENTS OF ENGINEERING GEOLOGY, *by Heinrich Reis, professor of geology, Cornell University, and Thomas L. Watson, late professor of geology, University of Virginia. John Wiley & Sons, Inc., New York, N. Y.* Price $3.75. The second edition of this well known book includes new chapters on the Geology of Reservoirs and Damsites and Historic Geology. The entire purpose of the book is to impart knowledge of geologic character that is needed by engineers who are required to engage in such lines as highway construction, tunneling, quarrying, water-supply systems, or erection of heavy structures. Among the fourteen chapters are the following: Important Rock-making Minerals, Relations of Rock to Engineering Work, Structural Features and Metamorphism, Rock-weathering and Soils, Landslides and Subsidence, Origin of Lakes and Swamps, and the two new chapters mentioned above.

Correspondence

To the Editor:

With reference to the answer of H. G. Wright, research engineer, Cement Machinery Division, Hardinge Co., Inc., dated York, Pa., to my recent letter which was published under the heading of "Correspondence" in the May 20 issue of PIT & QUARRY, I wish to state the following:

The terms "quick-hardening cement," "high-early-strength cement," and "near-perfect cement" are intended to be used synonymously by me.

Referring to the comments of Mr. Wright to the effect that quick-hard Portland cement has not been used long enough to draw conclusions. I again disagree with him. The first plant to manufacture quick-hard Portland cement was that of a concern in Switzerland, during the World War. The output of this plant was sold to the French Government and used by the latter in constructing foundations for their large guns. The foundations were put in one day and the large guns placed and fired the following day. Since that time, many plants throughout Europe have been re-built and new plants constructed which manufacture quick-hard cement. In fact the quick-hard product has generally replaced the ordinary Portland cement in Europe. The Associated Cement Co. of England practically re-built all their old plants, or built new plants to take their place, during the past few years. They installed 400-ft. kilns. We have now had tests of the quick-hard product for approximately fifteen years with the result that no retrogression takes place.

The plants of the United States have been slower to invest money in the reconstruction of old plants and almost all quick-hard Portland cement plants now producing have been new plants. Instead of accepting the improved product, a persistent campaign has been waged by cement interests to prevent the general adoption of quick-hard cement. In spite of this fact, however, great progress has been made in the transition of ordinary Portland to quick-hard Portland. A separate specification was recently adopted by the American Society of Testing Materials for the quick-hard product, and at least one of the largest companies of America is proceeding to reconstruct its plants to adopt the new method of manufacturing quick-hard Portland cement. It will merely be a matter of a few years until all plants will either be converted so that the quick-hard product can be manufactured or they will be compelled to scrap their plants as obsolete.

There are so many advantages in the use of the quick-hard cement that consumers will demand the same when it can be produced at no greater cost than the ordinary Portland cement.

CEMENT ENGR. CO.
Aman Moore, *Pres.*
Los Angeles, Calif.

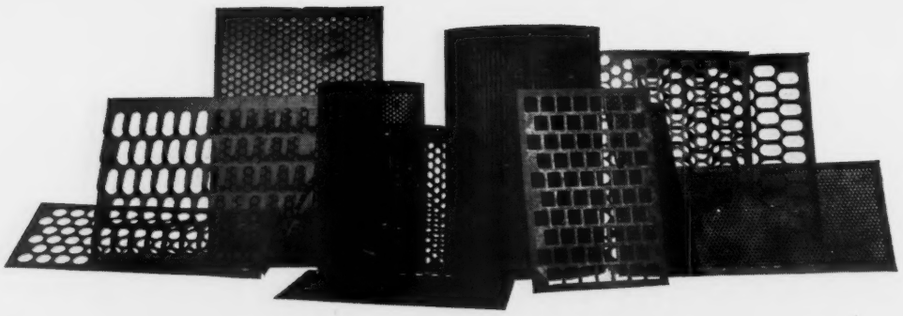
Cutler-Hammer Moves Its Atlanta District Office

The Atlanta, Ga., sales office of Cutler-Hammer, Inc., is now located at 133 Cone St., N. W., on the street floor. These new quarters also include warehouse facilities where a stock of motor control apparatus, wiring devices and safety switch items is carried for immediate delivery.

A. C. Gibson is manager of the Atlanta district.

The Pennsylvania Drilling Co., Pittsburgh, Pa., announces its removal from West Carson Street to 1201-1215 Chartiers Avenue, Pittsburgh (Elliott), Pa.

The Chicago office of Smith Engineering Works has been moved from Room 716, Builders Bldg., to Room 1204, 211 W. Wacker Drive.



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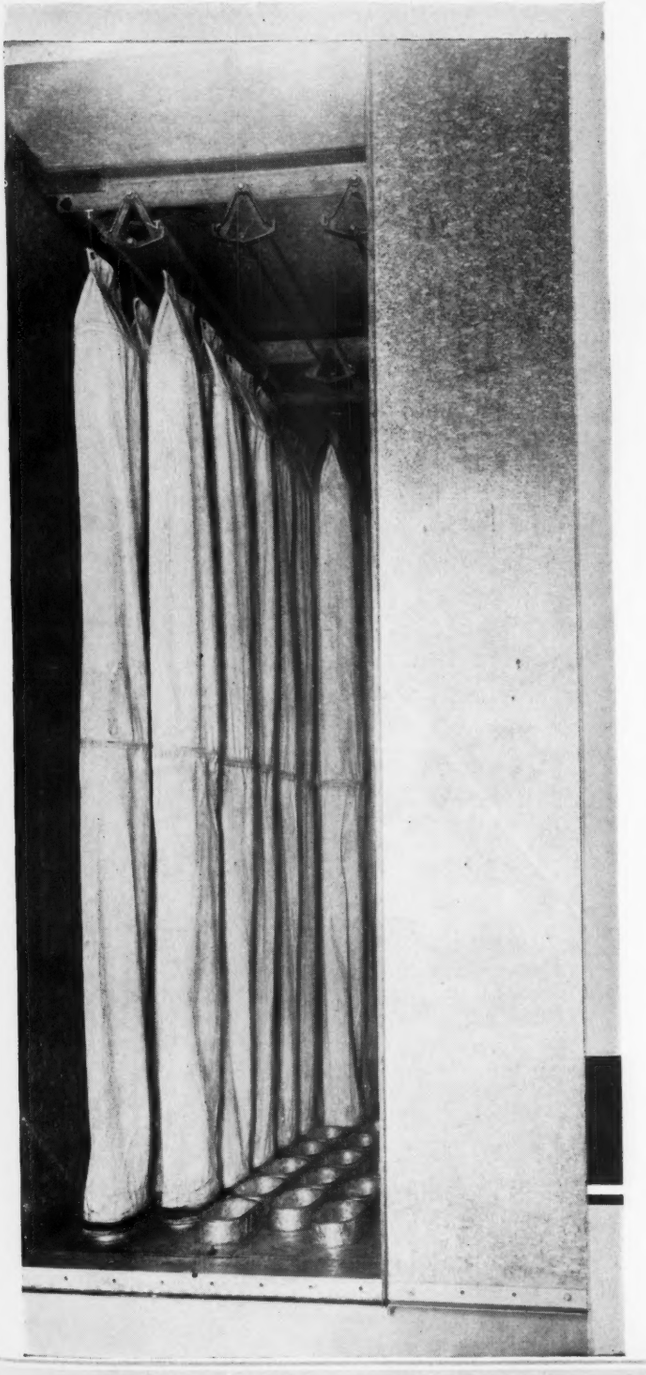

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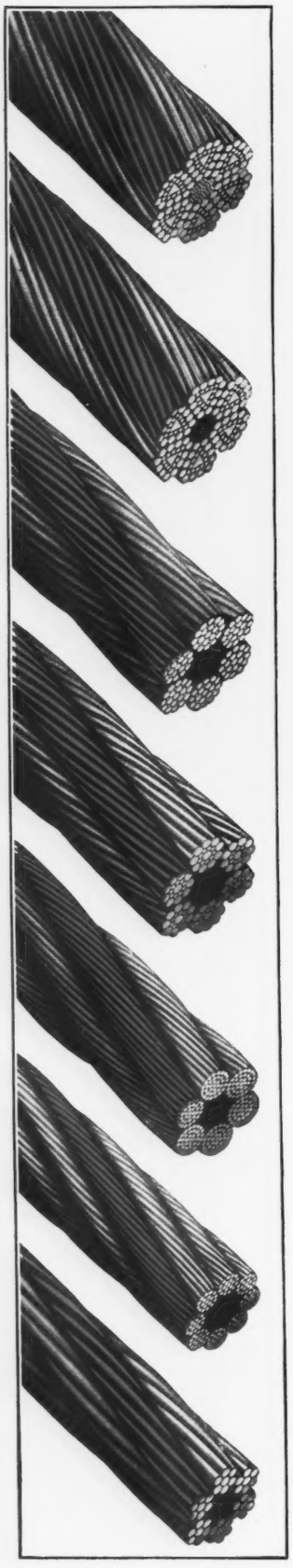

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Moreover, "HERCULES" (Red-Strand) Wire Rope is made of acid open-hearth steel wire, and every wire put into it is first rigidly tested by us to make sure it measures up to our exacting requirements.

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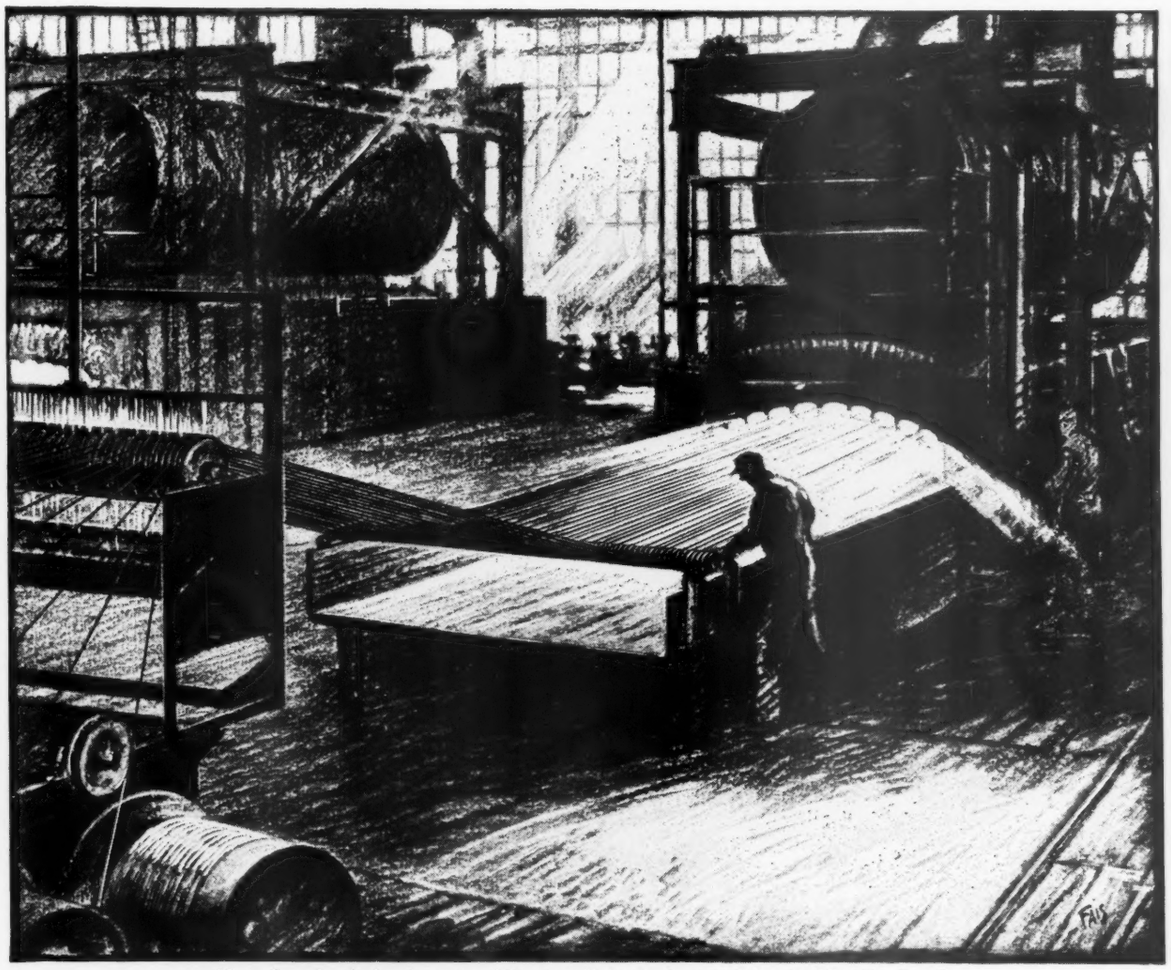

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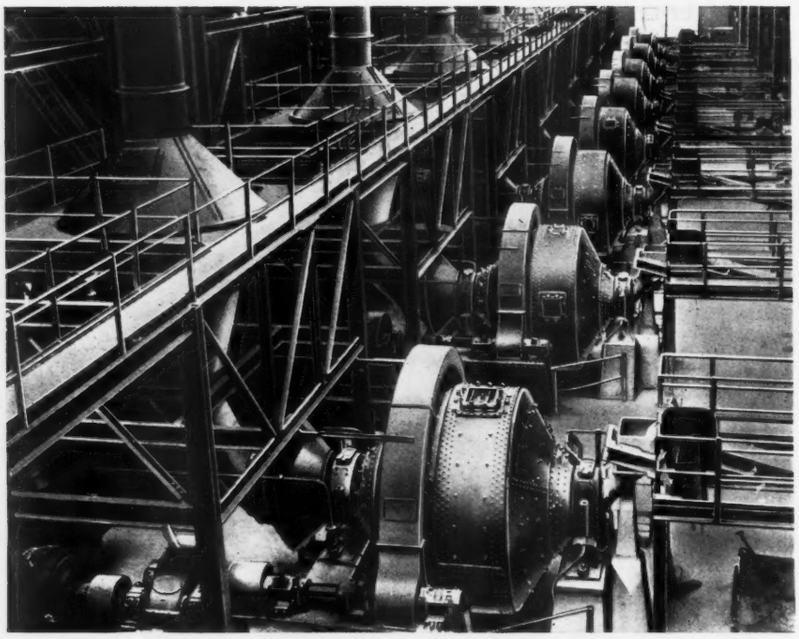

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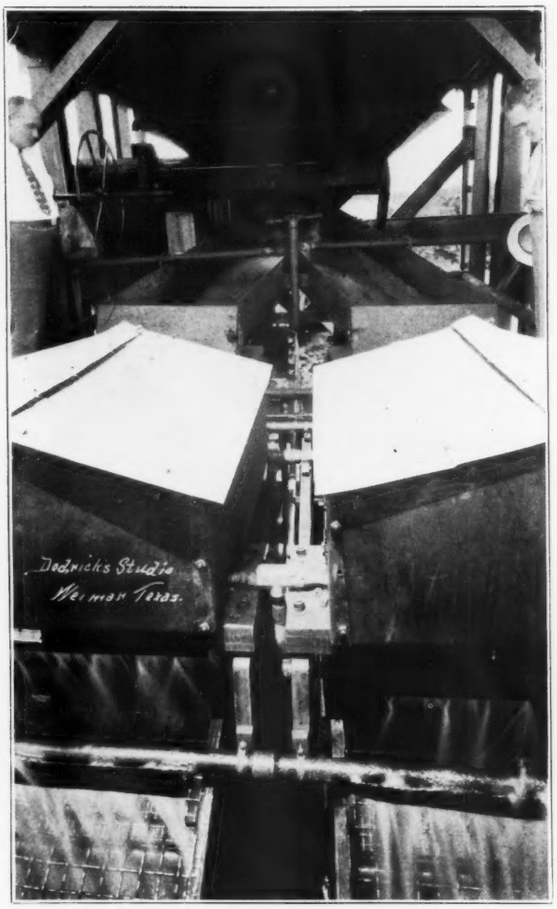

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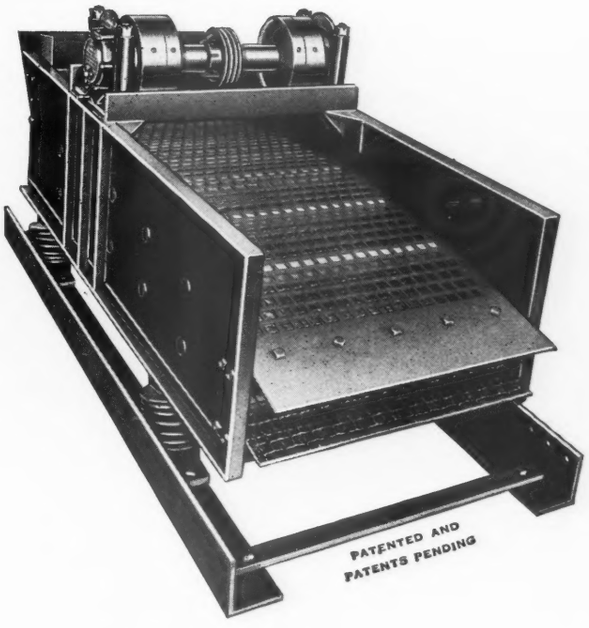

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See P&Q HAND BOOK *Page 266*

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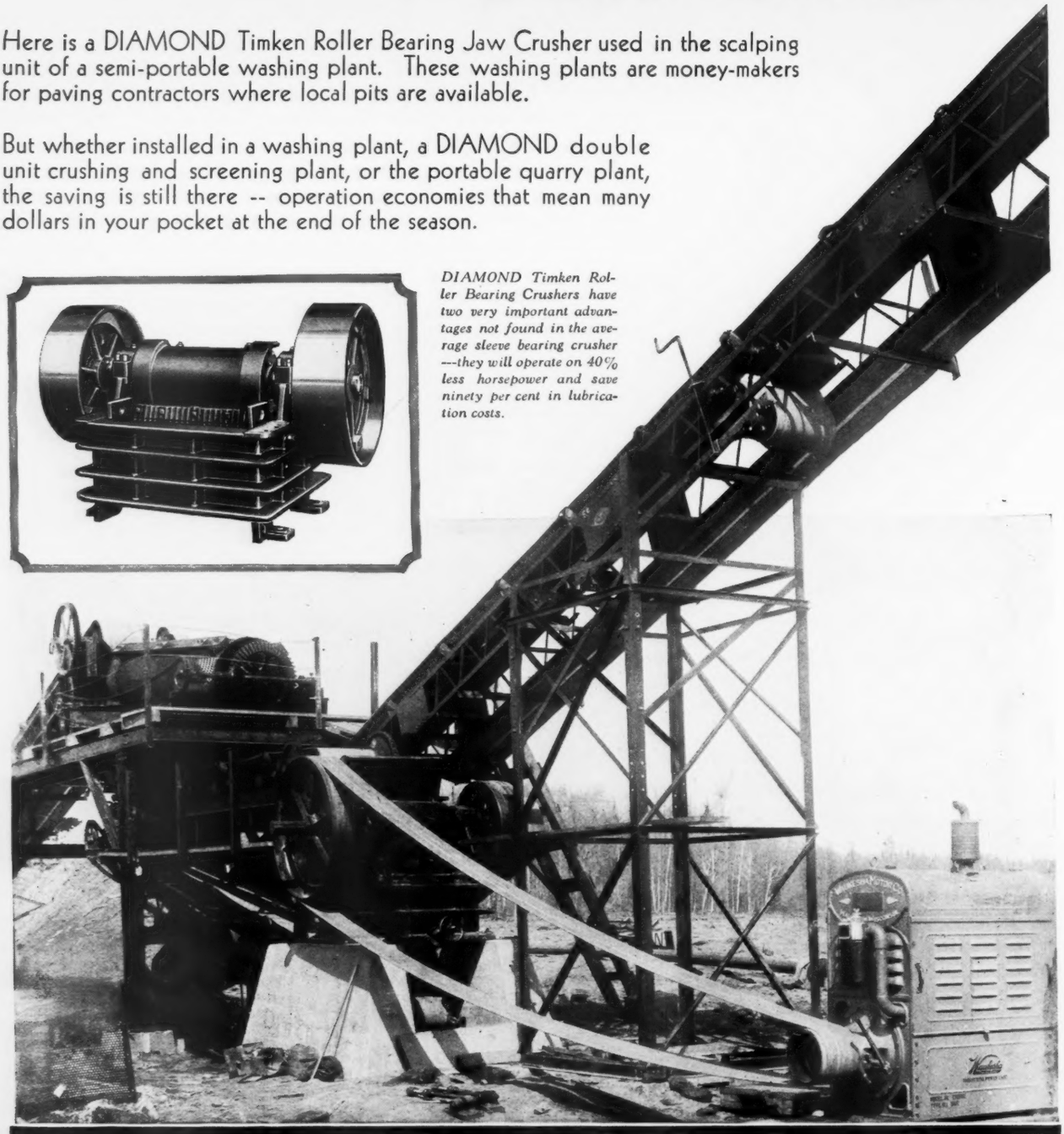

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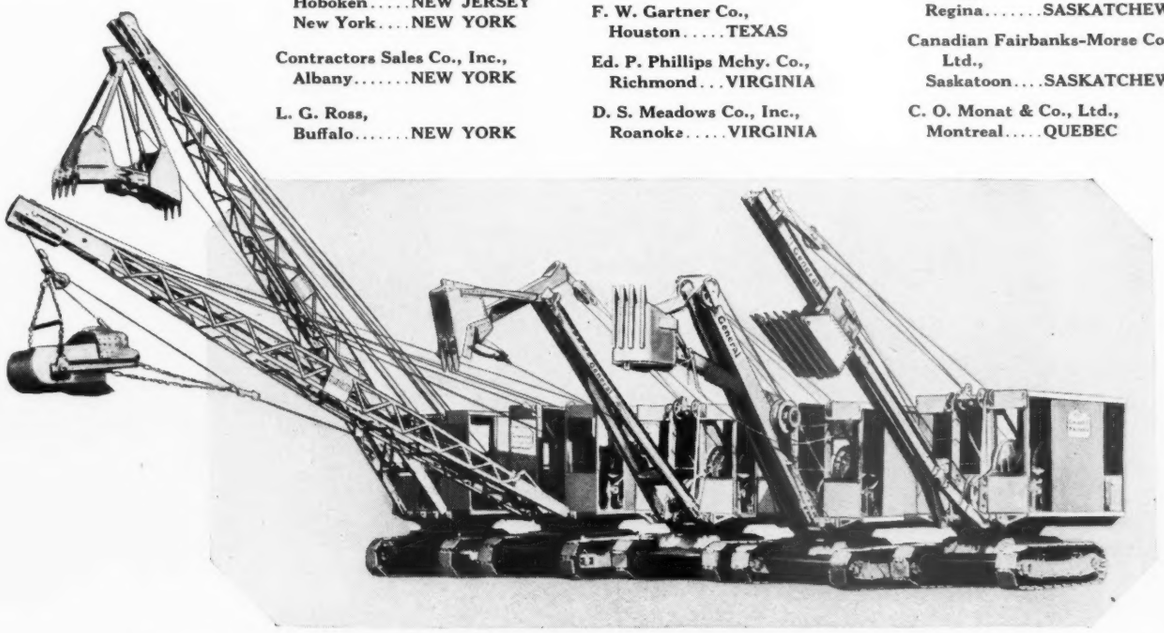

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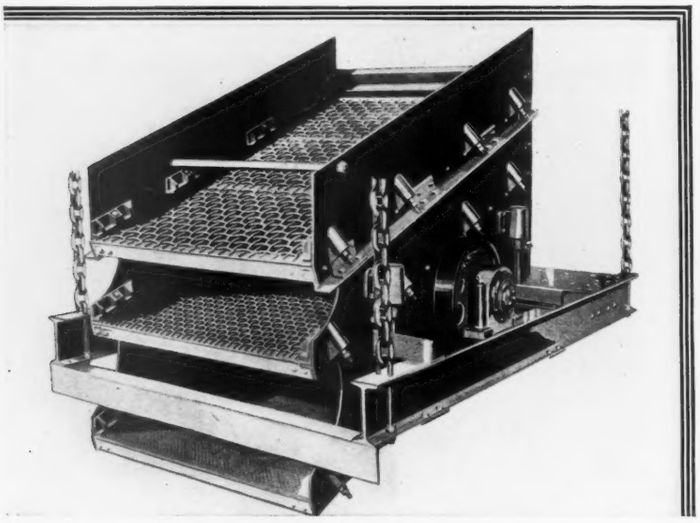

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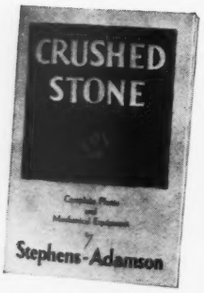

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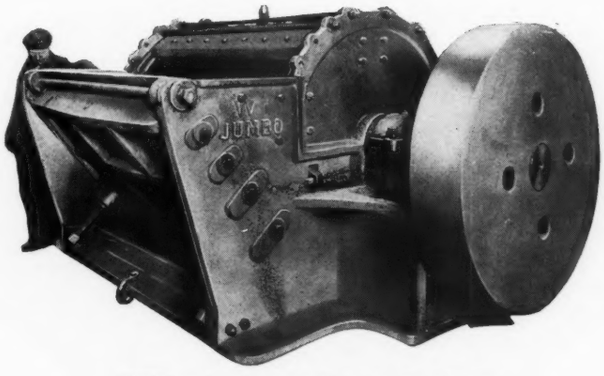

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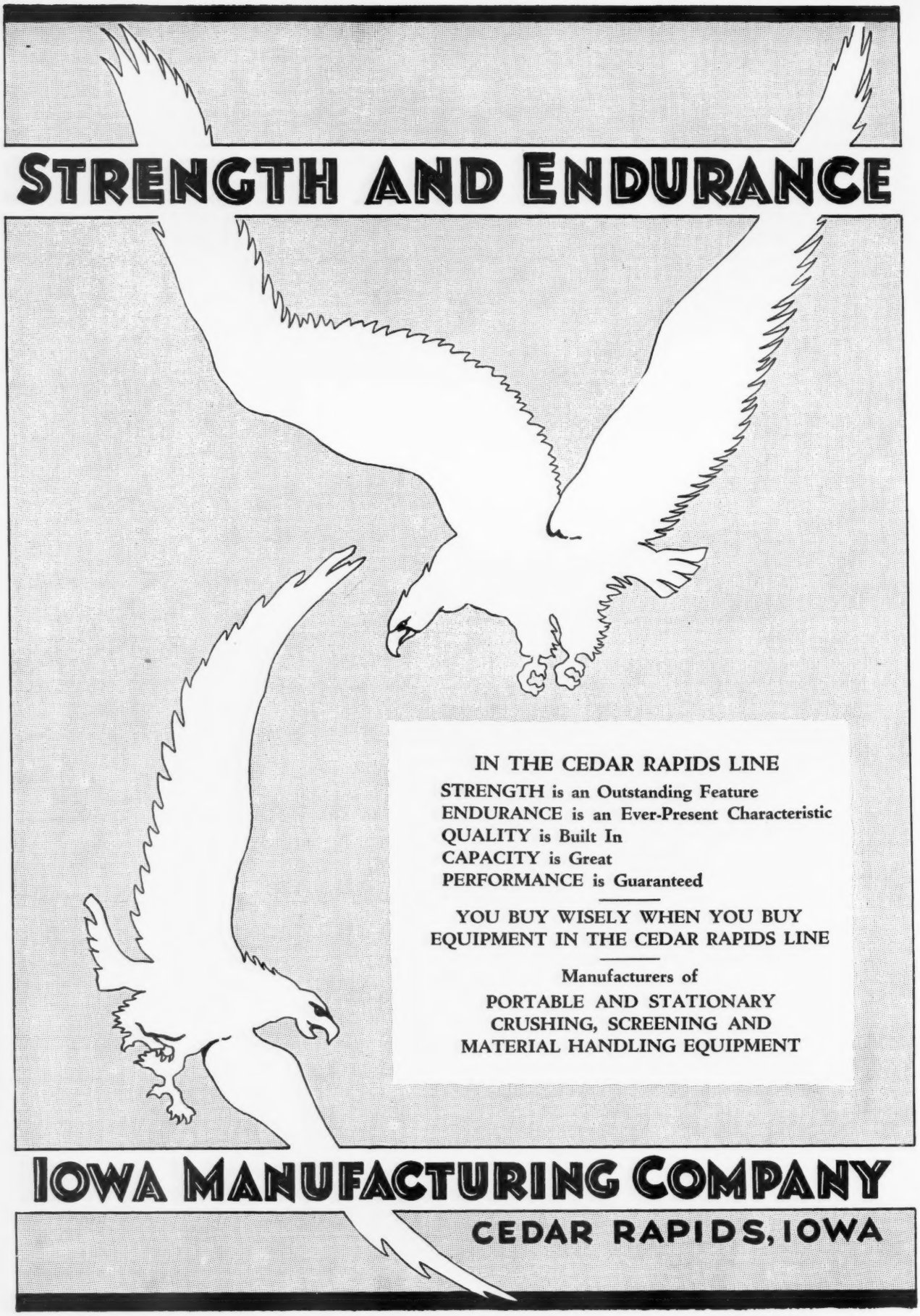

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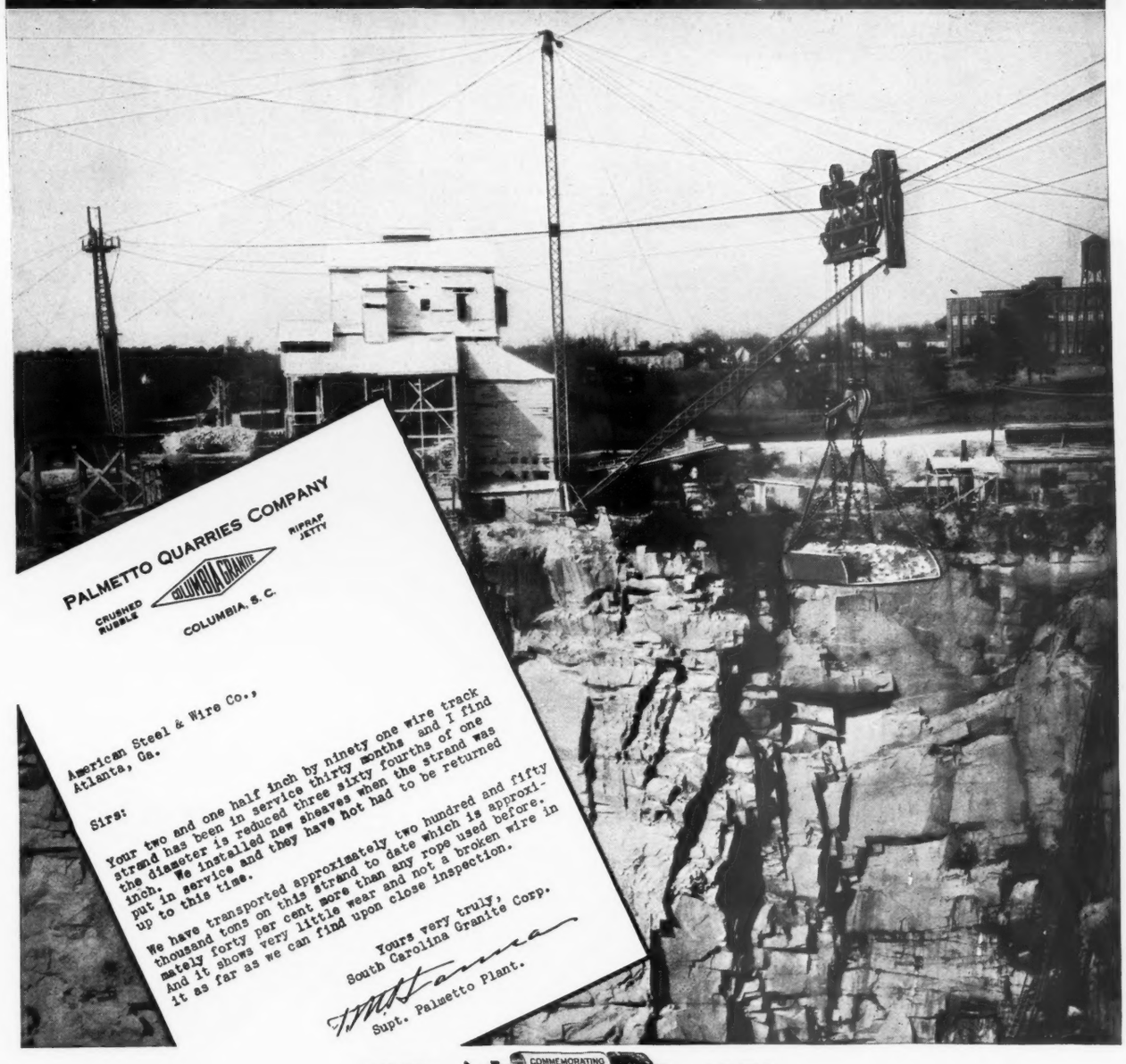

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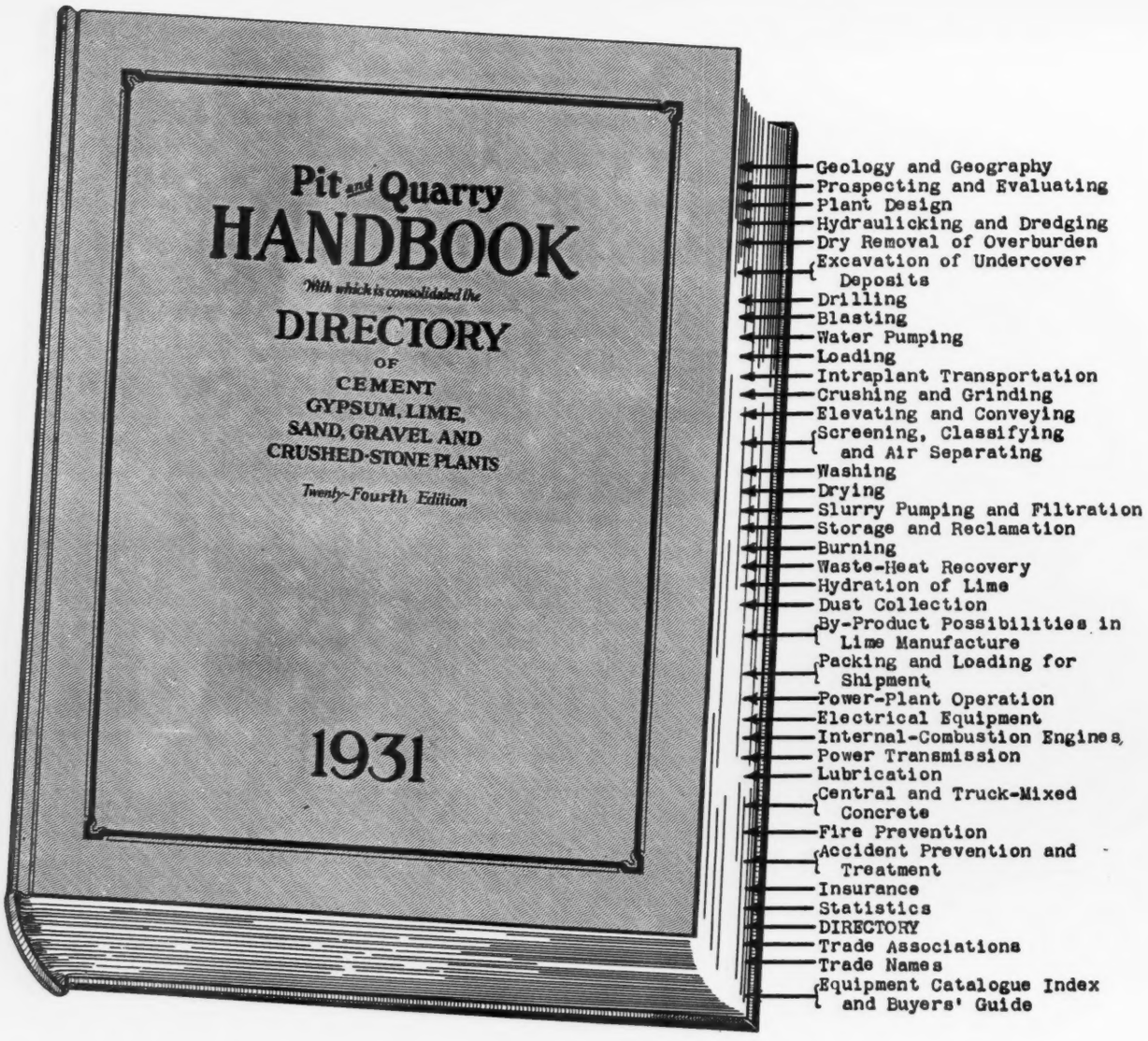

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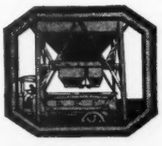

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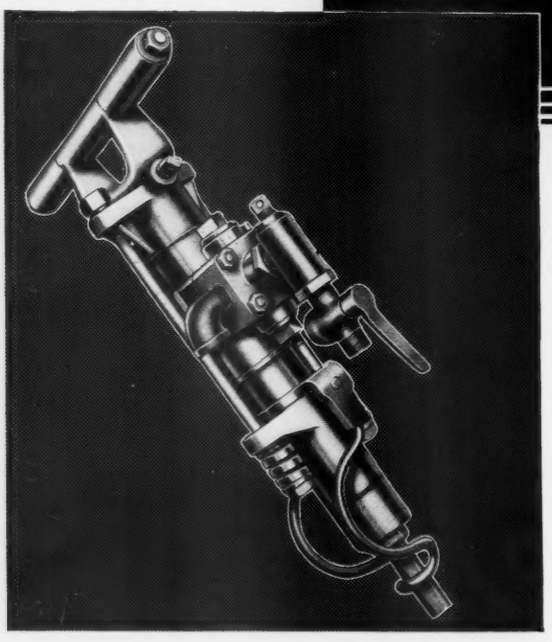

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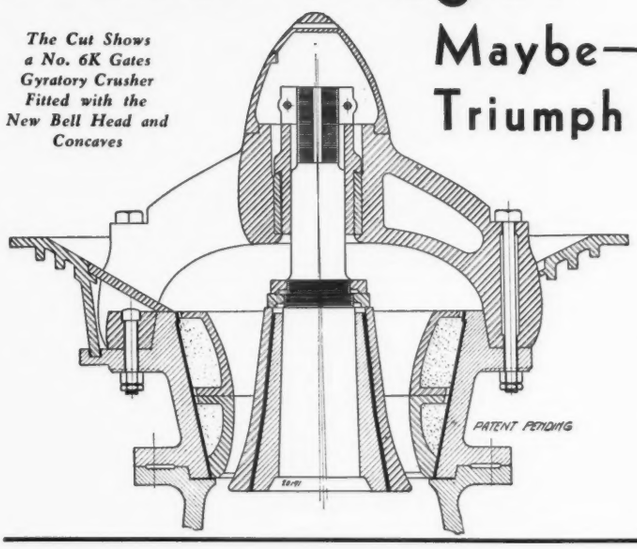


Maybe—but we call it Another Triumph of Modern Engineering

The capacity of ANY old gyratory can be doubled and a smaller product obtained by merely removing two or three parts of the old crusher and installing

TRAYLOR PATENTED
BELL HEAD AND CONCAVES
—AND THE COST IS NOT HIGH!

A Traylor man will be traveling in your direction soon. May he stop off and tell you all about it?

Send for our new Bulletin No. 110

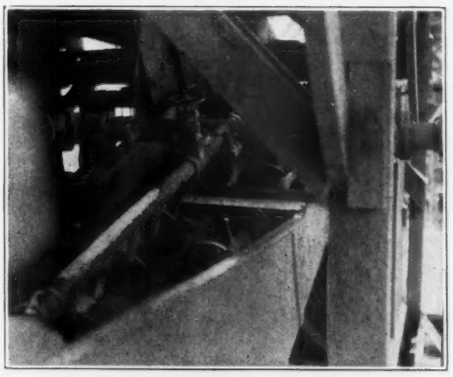
TRAYLOR ENGINEERING & MANUFACTURING CO.
ALLENTOWN, PENNSYLVANIA, U.S.A.

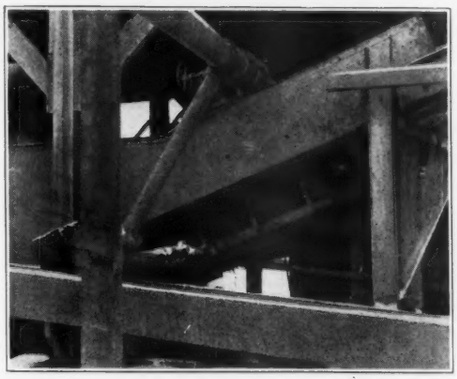
New York City, 2513 Empire State Bldg. — Chicago, 1414 Fisher Bldg. — Los Angeles, 908-909 Chester Williams Bldg. — Seattle, 815 Alaska Bldg. — Salt Lake City, 101 W. 2nd So. St.

EXPORT—104 Pearl Street, New York City

FOREIGN SALES AGENCIES: London, Lima, Valparaiso, Rangoon, Rio de Janeiro, Antofagasta, Sao Paulo, Iquique, Buenos Aires, Oruro, Johannesburg, Santiago

EUROPEAN WORKS: Usines Carels Freres, Ghent, Belgium





"Eminently Satisfactory"

Thus do Carroll Brothers, Inc., Buffalo, N. Y., describe the five Perfect Classifiers installed at their Sand and Gravel Plant at Clarence, N. Y. They are getting well graded, extremely clean sand and gravel in large tonnages from these Perfect Classifiers, which are satisfactory in every respect.

The Perfect Classifier will deliver 125 tons per hour of absolutely clean and polished sand and gravel. It is simple and compact in construction, with electrically welded seams and renewable manganese steel wearing plates. Screw flights are adequately protected against wear and breakage. Installation is very simple.

Write for Perfect Classifier Booklet, which explains advantages in detail.

THE PERFECT CLASSIFIER CO.

4027 CHARLOTTE AVENUE — **NASHVILLE, TENN.**

WHEN BETTER AIR SEPARATORS ARE BUILT, GAYCO BUILDS THEM

MODELS "TWENTY-SEVEN" and "TWENTY-EIGHT"
GAYCO CENTRIFUGAL SEPARATORS
REPRESENTS ANOTHER GAYCO ADVANCE IN AIR SEPARATOR PRACTICE

The GAYCO PATENTED method of sizing by CENTRIFUGAL FORCE has been perfected and the mechanical construction improved, giving greater capacity, cleaner tailing and higher efficiency than is possible with any other Air Separator.

Quick, Positive Adjustments for hundreds of different meshes.
Perfect, Automatic Lubrication without any oil waste.
Steep Angle Cones which prevent material from building up and choking.

NO DAMPERS — NO CHOKE DEFLECTORS — NO OIL-CUPS — NO GREASE-CUPS

RUBERT M. GAY COMPANY, INC., 114 Liberty St., New York, N.Y.
THE ONLY LOW VELOCITY AIR SEPARATOR WHICH SIZES BY CENTRIFUGAL FORCE

Elverite Castings
Including—
Lining Plates for Tube and Compartment Mills.
Elverite Balls for Fuller Mills.
Traction Wheels—Sprockets, Roll and Crusher Parts.
Roll Heads.

Fuller-Kinyon Transport System for Pulverized Fuel

FULLER LEHIGH CO., 85 Liberty St., New York, N.Y.
A BABCOCK & WILCOX ORGANIZATION
201

RAYMOND MILLS AND PULVERIZERS

For fine grinding, air separating and air drying all kinds of rock products and many other materials.
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1321 North Branch Street, CHICAGO

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IN the center of shopping and theatre district. Bed lamp, floor lamp . . . hand-set telephone, fans, circulating ice water, in every room. Club meals, Garage Service, Coffee Shop. Room and Bath $3.00 to $4.50.

Value
When You Go To
PHILADELPHIA at
HOTEL PENNSYLVANIA

A Room and a Bath For Two and a Half
WE HAVE THEM
$2.50 Single with Bath
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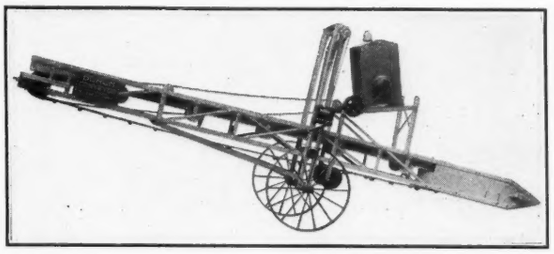
39th & CHESTNUT ST PHILADELPHIA

Versatile...



The Burch Portable Conveyor is obtainable in any desired length, as any number of 6-foot sections may be added to the original 20-foot unit. Made for 16, 18, 20 or 24-inch belt. May be tilted to any desired angle, to 6 inches to the foot. Easily moved.

May we send particulars?

The Burch Corporation

Crestline, Ohio

Gold Medal Explosives

SHOW RESULTS AT THE OPERATION

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Try a Shot of Gold Medal

An Established Product for a Quarter of a Century

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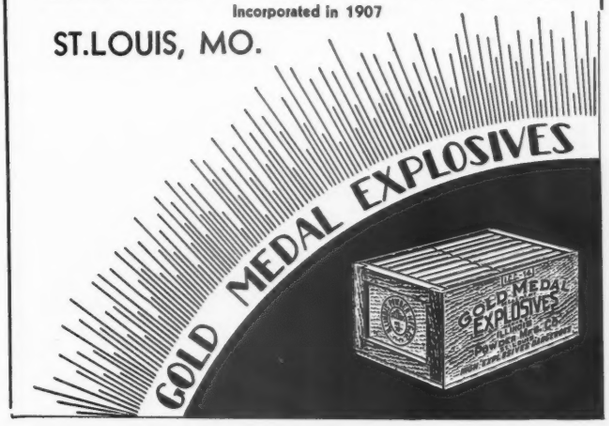
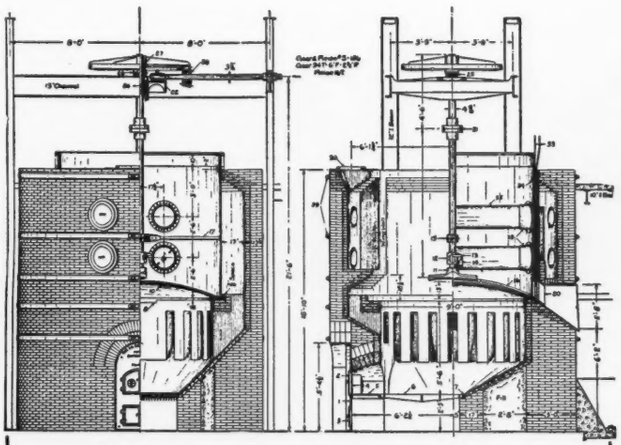
ILLINOIS POWDER MFG. CO

Incorporated in 1907

ST.LOUIS, MO.





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When you install Ehrsam Kettles you have made the best buy possible from the standpoint of efficiency, economy and production. Gypsum plant operators everywhere recognize Ehrsam Kettles as a real interest bearing investment.

You will readily see why, when you read the complete description of their superior design in our literature. Send for it today.

We also manufacture Mixers, Rotary Crushers, Fine Grinding Mills, Elevating and Conveying Machinery, etc.

The J. B. Ehrsam & Sons Mfg. Company

Enterprise, Kansas

B B

ENGINEERS & BUILDERS

of

CEMENT PLANTS

STONE CRUSHING PLANTS

LIME PLANTS

AND ALL TYPES OF INDUSTRIAL BUILDINGS LARGE OR SMALL

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21ST FLOOR NEWS PLAZA

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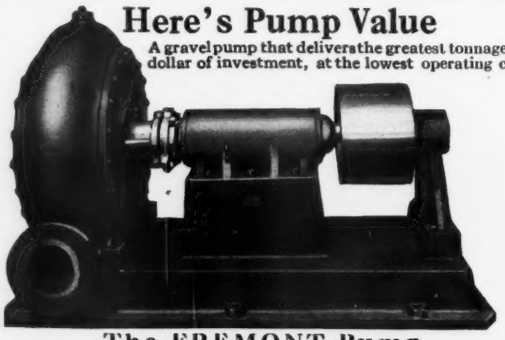
Allen Sand Tank

ALLEN CONES AND TANKS
for
Classifying and Dewatering Sand
Automatic Operation
No Power Required

Write for Details

THE ALLEN CONE AND MACHINERY CORP.
30 Church Street, New York City

Here's Pump Value
A gravel pump that delivers the greatest tonnage per dollar of investment, at the lowest operating cost.



The FREMONT Pump
Timken roller bearings; high-test, chilled semi-steel castings; perfected packing gland and water seal.
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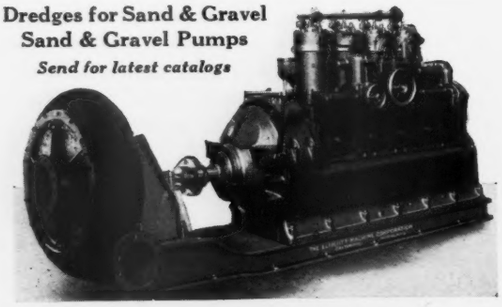
Fremont Foundry and Machine Co., FREMONT, NEBR.

Dredges for Sand & Gravel
Sand & Gravel Pumps
Send for latest catalogs



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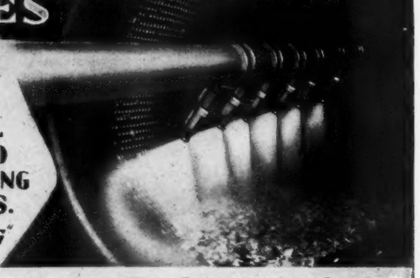
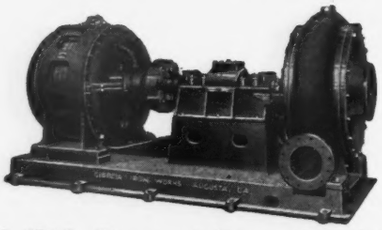
HYDRAULIC DREDGES-DREDGING PUMPS AND MACHINERY.
BALTIMORE, MARYLAND.

BINKS GRAVEL WASHING NOZZLES
for
EFFICIENT-ECONOMICAL-SAND, GRAVEL *and* CRUSHED STONE WASHING APPLICATIONS.
Write for Bulletin "G"



BINKS MANUFACTURING CO.
3108-46 CARROLL AVE. *Chicago*

SAND AND DREDGING PUMPS



A Wide Range of Sizes, 4″ to 14″
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GEORGIA IRON WORKS, AUGUSTA, GA.

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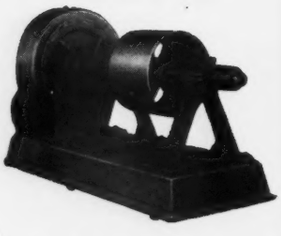
CENTRIFUGAL PUMPS
Dredges and Dredging Pumps; Slurry Pumps; Pumps for unwatering, drainage, washing, boiler feed, general service, etc.
66 Years of experience in building centrifugal pumps for every service
Send for bulletins
Morris Machine Works, Baldwinsville, N. Y.

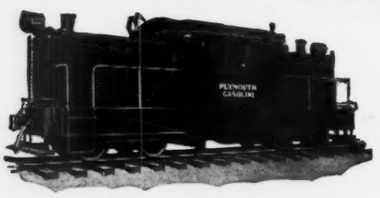
"HELP WANTED" and
"SITUATION WANTED"
Advertisements Produce Results

The Lightning
Sand and Gravel Pump
For that "tough" job—
For Big Volume—
For Low operating costs—
For general all-around excellence
You can't beat the Lightning
All sizes—All Capacities
Write for descriptive literature



KANSAS CITY HAY PRESS CO.
Kansas City, Mo.

PLYMOUTH
GASOLINE AND DIESEL
LOCOMOTIVES



FROM 2½ TONS to 100 TONS
WRITE FOR PERFORMANCE BULLETINS
PLYMOUTH LOCOMOTIVE WORKS
PLYMOUTH, OHIO

Quick Tilting

The JIGGER IS NOT A CLOGGER

The inclination on The JIGGER can be conveniently changed to meet any screening requirements. In changing the inclination of The JIGGER it is only necessary to loosen four hand nuts—without using a wrench—and the change to the proper angle can be made while the screen is running. This removes all guesswork and definitely enables the operator to obtain continuously satisfactory results.

May we send detailed information?

PRODUCTIVE EQUIPMENT CORPORATION

7535 South Claremont Ave. *Representatives from Coast to Coast* CHICAGO, ILL.

Perforated Metals—Screens of All Kinds—For Sand, Gravel, Stone, Etc.

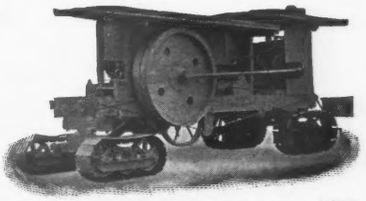
MATERIAL IN STOCK
PROMPT SHIPMENT

CHICAGO PERFORATING CO.
2435 West 24th Place
Tel. Canal 1459 CHICAGO, ILL.

LOOMIS "CLIPPER" BLAST HOLE DRILLS

Steel welded or wooden frame furnished
Manila or Steel Cable

Drill Faster Cut Labor Costs and Reduce Power Consumption



Superior drilling has been the record of "Clipper" Drills wherever used. That's why there are more "Clippers" in use than any other make. You buy the best when you buy "Clipper" Improved Type Drills.

Built in several sizes and styles for any size blast hole, and in steam, gasoline, compressed air or electric power. Also round wheels.

LOOMIS MACHINE COMPANY
Est. 1842 15 Market St., Tiffin, Ohio

LEADERS SINCE 1835

CRUSHERS—Double roll and Sledge Wedge Crushers, for practically any product. Capacities to 1000 tons an hour.

SUPER DRY PANS—For especially large tonnages.

WASHERS AND SCRUBBERS—Steel log Washers; scrubbers, cylinder washers, sand drags and washing screens.

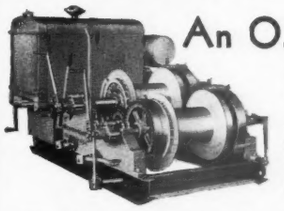
DRYERS—Revolving cylindrical, of various sizes.

JIGS—For concentrating and beneficiating hematite and manganese ores.

SCREENS—Cylindrical and conical screens of any size and capacity.

HOISTS, ELEVATORS AND CONVEYORS—Electric, friction and gravity hoists, steel conveyors of different sizes and capacities.

McLanahan & Stone Corp.
Hollidaysburg, Pa.



An O. K. Hoist for Every Purpose

The O. K. line of hoists is complete, ranging from 8 to 150 horsepower. Somewhere within this range is the hoist that will exactly fit your requirements. May we send details?

We also manufacture the O. K. Portable Air Compressor

O. K. Clutch & Machinery Co.
Box 305, COLUMBIA, PA.

High Efficiency Lime Kilns

THE McGann-Sobek Patented High Efficiency Lime Kiln is the first revolutionary advance in Lime Burning for many years. This kiln is continuously charged and continuously and automatically discharged. The fuel to lime ratio is 1 to 6. Labor savings repay investment. Write for complete information.

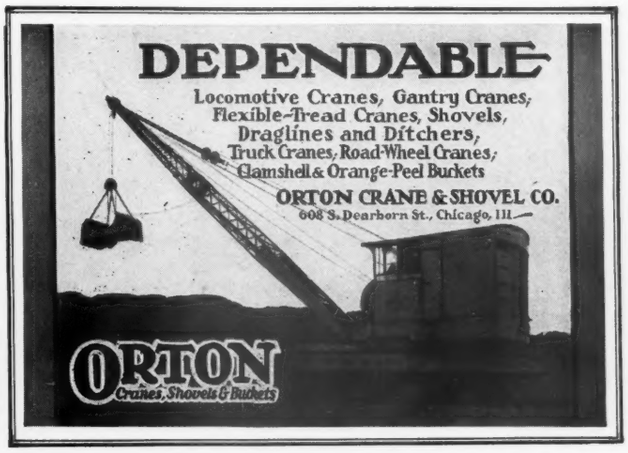
YORK KILNS & DRYERS
SCHULTHESS HYDRATORS

McGANN MANUFACTURING COMPANY, INC
Engineers and Manufacturers
CHICAGO YORK, PA. NEW YORK

DEPENDABLE

Locomotive Cranes, Gantry Cranes, Flexible-Tread Cranes, Shovels, Draglines and Ditchers, Truck Cranes, Road-Wheel Cranes, Clamshell & Orange-Peel Buckets

ORTON CRANE & SHOVEL CO.
608 S. Dearborn St., Chicago, Ill.



The Fertilizer
GREEN BOOK

Keeps You in Touch with Markets in the Fertilizer Field

The Fertilizer GREEN BOOK, published monthly, is a progressive and helpful news and editorial service offered to all producers and mixers of fertilizer and fertilizer materials.

If you produce any of these materials:

Gypsum (Land Plaster)
Agstone (Lime Stone)
Phosphate Rock
Lime
Marl

you should read the Fertilizer GREEN BOOK regularly. It is the one practical method of keeping in touch with this great field and its markets.

If you offer:

Machinery
Supplies
Service

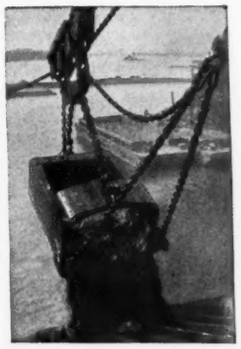
to the fertilizer industry the Green Book can be a great aid.

Progressive producers, manufacturers and distributors of fertilizer, fertilizer materials, etc., read the GREEN BOOK each month. That is why it is the best advertising medium for manufacturers of machinery and supplies and for those who offer a special service to the fertilizer industry.

Write us for Subscription or Advertising Rates.

Complete Service Publishing Co.
538 S. Clark Street **Chicago, Ill.**

Sauerman Slackline Cableway



BECAUSE of their long reach and ability to work under water, Sauerman Slackline Cableways are especially suited to digging material from deep pits or rivers. They will operate at a radius of 200 to 1000 ft. or more and dig and convey material to an elevated hopper at the rate of 30 to 50 bucketloads an hour. Built in sizes from ¼ to 3½ cu. yd.

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SAUERMAN BROS., Inc.
434 S. Clinton St., Chicago

Midwest Gasoline & Diesel Locomotives

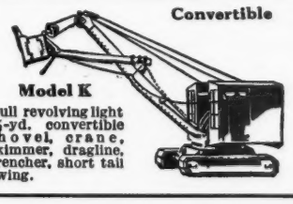
are built right for Quarry and Gravel Pit

SERVICE—LET US TELL YOU ABOUT THEM
Write
MIDWEST LOCOMOTIVE WORKS
HAMILTON, OHIO

Lewistown Foundry Products ARE Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS

Lewistown Foundry & Machine Co.
Lewistown, Pa.



POWER SHOVELS
Cranes, Trenchers
SKIMMERS
Full or part circle
BAY CITY SHOVELS, Inc.
Bay City, Mich.

DREDGES

Twenty-three years of practical experience building Hydraulic dredges. Our experience is at your service. Find out about NORBALLOY the new alloy steel—ideal for dredging purposes.

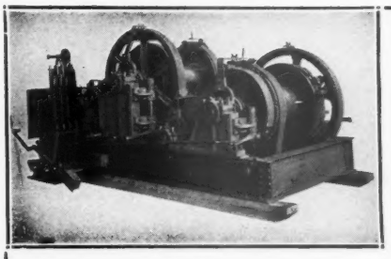
NORBOM ENGINEERING CO.
Darby **Penna.**

J&L WAREHOUSES
CHICAGO CINCINNATI
DETROIT NEW ORLEANS
PITTSBURGH

Louisville—Stock of Bars for Concrete Reinforcement and Bar Fabricating Yard.

Memphis—Distributing Warehouse for Pipe, Sheets, Spikes and Wire Products, Reinforcing Bar Warehouse and Fabricating Shop.

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
PITTSBURGH **PENNSYLVANIA**



STREET

SLACKLINE HOISTS ARE KNOWN FOR DEPENDABILITY AND EASE OF OPERATION. THEY ARE BUILT WITH JUST AN ADDED TOUCH OF TOMORROW.

ASK FOR BULLETIN

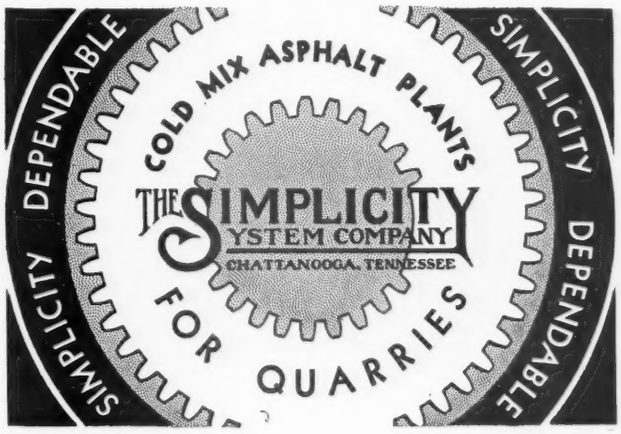
HOISTS DERRICKS CABLEWAYS SLACKLINE EXCAVATORS

STREET BROS. MACHINE WORKS
Incorporated
CHATTANOOGA, TENN.

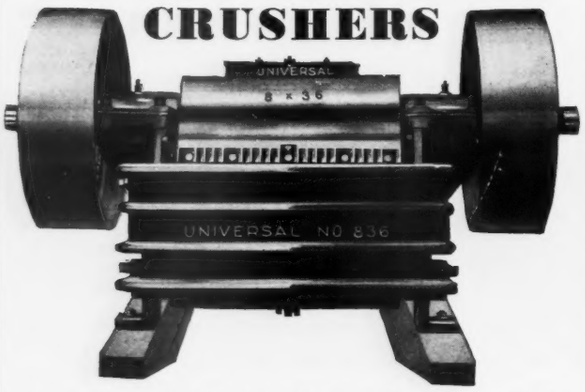
OHIO LOCOMOTIVE CRANES

ERECTION CRANES - LOGGING CRANES
WHARF, BARGE AND GANTRY CRANES
RAILROAD PILE DRIVERS
CRAWLER CRANES & SHOVELS

THE OHIO LOCOMOTIVE CRANE CO.
BUCYRUS, OHIO



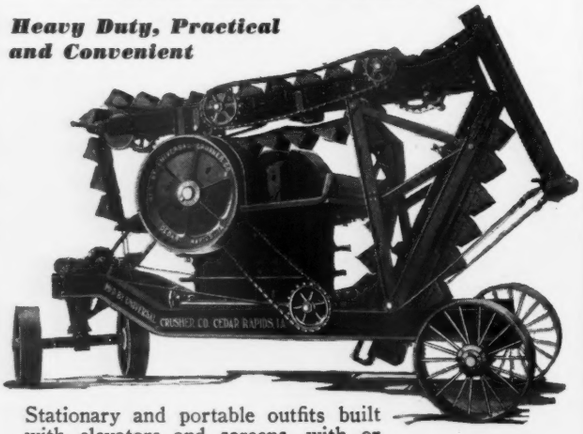
UNIVERSAL
CRUSHERS



Popularly used, both for *primary* and *secondary crushing,* in stone quarries, gravel pits, mines, brick and tile plants; for state, county, and municipal road building; by road and construction contractors; in fact, wherever a crusher is needed.
Made in 26 sizes. Capacities up to 450 tons a day.

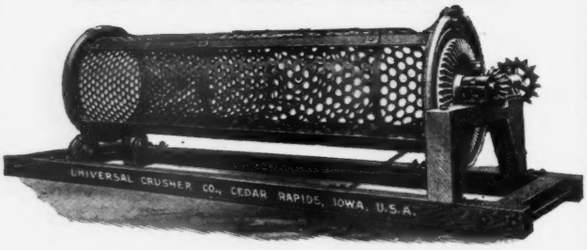
STATIONARY and PORTABLE OUTFITS

Heavy Duty, Practical and Convenient



Stationary and portable outfits built with elevators and screens, with or without power, to meet individual demands. Special attention is given to portable crushing and screening outfits for Highway Builders, Contractors, quarries, pits, etc. These combination outfits are exceptionally strong and durably constructed, yet they are light enough to move quickly over ordinary roads.

REVOLVING SCREENS



We furnish screens for light, medium, or heavy service and in any length desired. We, also, furnish perforated steel plates and steel wire screen sections in any weight, mesh, diameter, or length to meet your requirements.

CONVEYORS, BINS, HAMMER PULVERIZERS

Write for Catalogue

UNIVERSAL CRUSHER COMPANY

619 C Ave. W **Cedar Rapids, Iowa**

DEPENDABLE EQUIPMENT

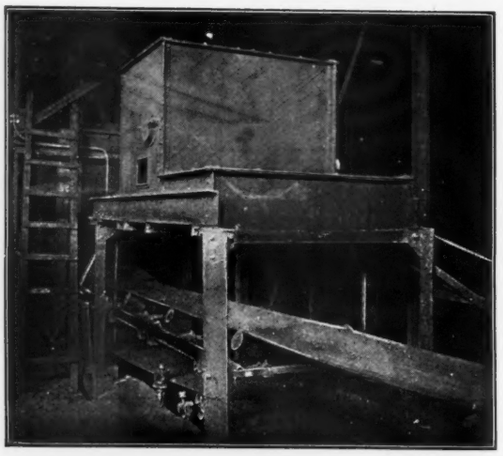
BUILT FOR LONG, HARD SERVICE WITH LOW MAINTENANCE COST

We offer RELIANCE Crushing, Screening and Washing equipment in capacities from 50 to 1500 tons per day. Simplicity of design with low operating cost and clean separation.

CATALOGUE AND FULL INFORMATION ON REQUEST

UNIVERSAL ROAD MACHINERY CO.
KINGSTON, N. Y.

SALES OFFICES THROUGHOUT THE WORLD



The Merrick Conveyor WEIGHTOMETER!

Will weigh within a guaranteed accuracy of 99% any material passing over a conveyor upon which it is installed, and doing it without additional handling, expensive labor, or loss of time.
Weightometers are ideal for weighing stone, gravel, sand, coal and hundreds of other conveyor-handled products.
When properly installed it does its work faithfully and correctly—requires little attention. Write for full details.

MERRICK SCALE MFG. COMPANY
PASSAIC, NEW JERSEY

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

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Agitating Ladders (Dredge)
Eagle Iron Works
Ellicott Machine Corp.

Agitators, Thickeners and Slurry Mixers
Hardinge Co.
Traylor Eng. & Mfg. Co.

Air Compressors
Independent Pneumatic Tool Co.
O. K. Clutch & Machinery Co.
Traylor Eng. & Mfg. Co.

Air Separators
Gay Co., Inc., Rubert M.
Hardinge Co.
McGann Mfg. Co.
Parsons Engineering Co.
Raymond Bros. Impact Pulv. Co.
Universal Road Machinery Co.

Ash- and Refuse-Handling Equipment
Harnischfeger Corp.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Asphalt, Cold Mix, Plants
Simplicity System Co.

Automatic Feeders
Hardinge Co.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Automatic Weighers
Merrick Scale Mfg. Co.

Balls (Grinding)
Hardinge Co.

Balls (Tube-Mill, etc.)
Hardinge Co.

Barges (Steel)
Jones and Laughlin Warehouses
Norbom Engineering Co.

Bars (Steel)
Jones and Laughlin Warehouses

Bearings (Anti-Friction)
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Belting
Link-Belt Co.
Stephens-Adamson Mfg. Co

Bins (Concrete)
Burrell Eng. & Const. Co.

Bins (Steel)
Butler Bin Co.
Diamond Iron Works
Fremont Foundry and Machine Co.
Iowa Mfg. Co.
Jones and Laughlin Warehouses
McLanahan and Stone Corp.
Stephens-Adamson Mfg. Co.

Bin Gates
Butler Bin Co.
Industrial Brownhoist Corp.
Iowa Mfg. Co.
Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.

Blast-Hole Drills (See Drills—Blast-Hole)

Blasting Supplies
Illinois Powder Mfg. Co.

Blocks (Sheave)
Norbom Engineering Co.
Sauerman Bros.
Street Bros. Machine Works, Inc.

Bolts
Jones and Laughlin Warehouses

Borings, Core
Pennsylvania Drilling Co.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Dragline Cableway)
Link-Belt Co.
Sauerman Bros.
Street Bros. Machine Works, Inc.

Buckets (Elevator and Conveyor)
Industrial Brownhoist Corp.
Iowa Mfg. Co.
Link-Belt Co.
McLanahan and Stone Corp.
Norbom Engineering Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.

Buckets (Clamshell, Orange-Peel, etc.)
Industrial Brownhoist Corp.
Link-Belt Co.
Orton Crane & Shovel Co.

Buhr Mills
Ehrsam & Sons Mfg. Co., J. B.

Buildings, Steel
Jones and Laughlin Warehouses

Cableways
American Steel and Wire Co.
Leschen and Sons Rope Co., A.
Link-Belt Co.
Roebling's Sons Co., John A.
Sauerman Bros. (Slackline)
Street Bros. Machine Works

Calcining Kettles (Gypsum)
Ehrsam & Sons Mfg. Co., J. B.

Capstans (See Winches and Capstans)

Car Dumpers
Link-Belt Co.

Car Pullers
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Carriers
Link-Belt Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.

Cars (Dump)
Stephens-Adamson Mfg. Co.

Cars (Industrial)
Stephens-Adamson Mfg. Co.

Cars (Transfer)
Stephens-Adamson Mfg. Co.

Car Wheels (See Wheels—Car)

Castings
Eagle Iron Works
Fuller Lehigh Co.
Hardinge Co.
Iowa Mfg. Co.
Link-Belt Co.
McLanahan and Stone Corp.
Norbom Engineering Co.
Rogers Iron Works Co.
Stephens-Adamson Mfg. Co.

Cement Pumps (See Pumps; Air Pumps)

Central Mixing Plants
Stephens-Adamson Mfg. Co.

Chain (Elevating and Conveying)
Link-Belt Co.
Norbom Engineering Co.
Stephens-Adamson Mfg. Co.

Chain Drives
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Chutes and Chute Liners
Iowa Mfg. Co.
Jones and Laughlin Warehouses
McLanahan and Stone Corp.
Morrow Mfg. Co.
Stephens-Adamson Mfg. Co.

Clamshell Buckets (See Buckets—Clamshell, Orange-Peel, etc.)

Clamshell Gates (See Gates-Clamshell)

Classifiers
Allen Cone and Machy. Corp.
Iowa Mfg. Co.
Lewistown Foundry & Machine Co.
Link-Belt Co.
Perfect Classifier Co.
Stephens-Adamson Mfg. Co.

Clips (Wire Rope)
American Steel and Wire Co.
Roebling's Sons Co., John A.

Clutches
Link-Belt Co.
O. K. Clutch & Machinery Co.

Coal-Pulverizing Equipment
Fuller Lehigh Co.
Gay Co., Inc., Rubert M.
Hardinge Co.
Raymond Bros. Impact Pulv Co.

Compressors (See Air Compressors)

Cones (Sand-Washing)
Allen Cone and Machy. Corp.
Iowa Mfg. Co.
Link-Belt Co.

Contractors and Builders
Burrell Eng. & Const. Co.

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
Diamond Iron Works
Iowa Mfg. Co.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Conveyors and Elevators
Burch Corp.
Diamond Iron Works
Industrial Brownhoist Corp.
Iowa Mfg. Co.
Lewistown Foundry & Machinery Co.
Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Smith Engineering Works.
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.
Universal Crusher Co.
Universal Road Machinery Co.
Williams Patent Crusher & Pulverizer Co.

Coolers (See Kilns and Coolers—Rotary)

Couplings (Flexible and Shaft)
Link-Belt Co.
Norbom Engineering Co.

Couplings (Hose, Pipe, etc.)
Independent Pneumatic Tool Co.

Cranes (Crawler and Locomotive)
Bay City Shovels, Inc.
General Excavator Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Link-Belt Co.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes (Overhead Traveling Electric)
Harnischfeger Corp.
Industrial Brownhoist Corp.

Crusher Parts
McLanahan and Stone Corp.

Crushers (Hammer)
Universal Crusher Co.
Williams Patent Crusher and Pulverizer Co.

Crushers (Jaw and Gyratory)
Beans Foundry Co., J. H.
Diamond Iron Works
Iowa Mfg. Co.
Lewistown Foundry & Machinery Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulverizing Co.

Crushers, Oscillating
Beans Foundry Co., J. H.

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Crushers (Rotary)
Beans Foundry Co., J. H.
Ehrsam & Sons Mfg. Co., J. B

Crushers (Roll)
Beans Foundry Co., J. H.
Link-Belt Co.
McLanahan and Stone Corp.

Crushing Rolls
Link-Belt Co.
McLanahan and Stone Corp.
Traylor Eng. & Mfg. Co.

Derricks and Derrick Fittings
Harnischfeger Corp.

Diesel Engines (See Engines—Diesel)

Dippers and Teeth (Power-Shovel)
Bay City Shovels, Inc.
Harnischfeger Corp.
Orton Crane & Shovel Co.

Dragline Cableway Excavators
Link-Belt Co.
Sauerman Bros.
Street Bros. Machine Works

Dragline Excavators
Bay City Shovels, Inc.
General Excavator Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Link-Belt Co.
Orton Crane and Shovel Co.

Dredge Chain (See Chain)

Dredge Pipe (See Pipe)

Dredges
Ellicott Machine Corp.
Morris Machine Works
Norbom Engineering Co.
Street Bros. Machine Works, Inc.

Drilling Accessories
Loomis Machine Co.

Drilling Contractors
Pennsylvania Drilling Co.

Drills (Blast-Hole)
Independent Pneumatic Tool Co.
Loomis Machine Co.

Drills, Diamond
Pennsylvania Drilling Co.

Drills (Rock)
Independent Pneumatic Tool Co.

Drills (Well) (See Drills—Blast-Hole)

Dryers
Fuller Lehigh Co.
Hardinge Co. (Ruggles-Coles)
Iowa Mfg. Co.
Lewistown Fdry & Mach. Co.
McGann Mfg. Co., Inc.
McLanahan and Stone Corp.
(Ruggles Coles) Hardinge Co.
Traylor Eng. & Mfg. Co.

Dust Arrestors
Parsons Engineering Co.

Dust-Collecting Systems
Parsons Engineering Co.
Raymond Bros. Impact Pulverizer Co.

Dynamite (See Explosives)

Elevators (See Conveyors and Elevators)

Engineers
Allen Cone and Machy. Corp.
Burrell Eng. & Const. Co.
Iowa Mfg. Co.
McLanahan and Stone Corp.
Parsons Engineering Co.
Stephens-Adamson Mfg. Co.

Engines (Hoisting)
Street Bros. Machine Works, Inc.

Engines (Steam)
Morris Machine Works

Excavating Machinery (See Shovels; Cranes; Buckets; etc.)

Explosives
Illinois Powder Mfg. Co.

Fans, Exhaust
Parsons Engineering Co.

Feeders
Diamond Iron Works
Hardinge Co.
Iowa Mfg. Co.
Link-Belt Co.
Morrow Mfg. Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Williams Patent Crusher & Pulverizer Co.

Forgings (Steel)
Harnischfeger Corp.
Jones and Laughlin Warehouses

Gasoline Engines (See Engines—Internal-Combustion)

Gates (Bin) (See Bin Gates)

Gears, Herringbone
Link-Belt Co.

Gears and Pinions
Link-Belt Co.

Gelatin (See Explosives)

Generators (See Motors and Generators)

Glass Sand Equipment
Lewistown Foundry & Machine Co.

Grab Buckets (See Buckets—Clamshell, Orange-Peel, etc.)

Grating, Steel
Jones and Laughlin Warehouses

Grinding Balls
Hardinge Co.

Grizzlies
Eagle Iron Works
Iowa Mfg. Co.
Lewistown Fdy. & Mach. Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.
Universal Road Machy. Co.

Guns (Hydraulic)
Binks Mfg. Co.
Georgia Iron Works

Gypsum Plaster Plants
Ehrsam & Sons Mfg. Co., J. B.

Hammer Mills (See Crushers—Hammer)

Hoists
Ellicott Machine Corp.
Harnischfeger Corp.
Independent Pneumatic Tool Co.
Industrial Brownhoist Corp.
Iowa Mfg. Co.
Link-Belt Co.
McLanahan and Stone Corp.
Sauerman Bros.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Street Bros. Machine Works

Hose Couplings (See Couplings)

Hydrators (Lime)
McGann Mfg. Co., Inc.

Hydraulic Guns (See Guns—Hydraulic)

Idlers
Link-Belt Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.

Kettles (Calcining)
Ehrsam & Sons Mfg. Co., J. B.

Kilns and Coolers (Rotary)
Hardinge Co.
McGann Mfg. Co., Inc.
Traylor Eng. & Mfg. Co.

Kilns (Vertical)
Hardinge Co.
McGann Mfg. Co., Inc.

Lime-Handling Equipment
Hardinge Co.
Iowa Mfg. Co.
Link-Belt Co.
McGann Mfg. Co.
Raymond Bros. Impact Pulv. Co.
Stephens-Adamson Mfg. Co.

Lime Kilns
Hardinge Co.
McGann Mfg. Co.

Lime and Hydrating Plants
Hardinge Co.
McGann Mfg. Co., Inc.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Loaders and Unloaders
Burch Corp.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Locomotives (Diesel)
Fate-Root-Heath Co.
Mid-West Locomotive Works
Plymouth Locomotive Works

Locomotives (Diesel-Electric)
Fate-Root-Heath Co.
Mid-West Locomotive Works
Plymouth Locomotive Works

Locomotives (Gas-Electric)
Fate-Root-Heath Co.
Mid-West Locomotive Works
Plymouth Locomotive Works

Locomotives (Oil-Electric)
Fate-Root-Heath Co.
Mid-West Locomotive Works
Plymouth Locomotive Works

Locomotives (Electric, Gas, and Steam)
Fate-Root-Heath Co.
Mid-West Locomotive Works
Plymouth Locomotive Works
Porter Co., H. K.

Magnetic Clutches (See Clutches, Magnetic)

Manganese Steel (Plates and Sheets)
Jones and Laughlin Warehouses

Mill Liners and Linings (Iron for Ball and Tube Mills)
Hardinge Co.

Mills (Grinding) (See also Crushers—Hammer)
Allen Cone and Machy. Corp.
Ehrsam & Sons Mfg. Co., J. B.
Fuller Lehigh Co.
Hardinge Co.
Lewistown Fdy. & Mach. Co.
Raymond Bros. Impact Pulv. Co.
Traylor Eng. & Mfg. Co.

Mixers, Plaster, Fiber, and Retarder
Ehrsam & Sons Mfg. Co., J. B

Motors (Internal-Combustion) (See Engines—Internal-Combustion)

Nails
American Steel and Wire Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Suction Screen)
Binks Mfg. Co.
Eagle Iron Works

Nuts
Jones and Laughlin Warehouses

Ore Separators
Allen Cone and Machy. Corp.

Oxygen (Liquid) (See Liquid Oxygen)

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Perforated Metals
Chicago Perforating Co.
Morrow Mfg. Co.

Pipe, Cast Iron (Sectional)
Burch Corp.

Pipe, Dredge (Floating and Shore)
Ellicott Machine Corp.
Fremont Foundry and Machine Co.

Pipe Flanges
Fremont Foundry and Machine Co.
Georgia Iron Works

Pipe, Steel
Jones and Laughlin Warehouses

Plates, Steel (High and Low Carbon)
Jones and Laughlin Warehouses

Plug Valves (See Valves)

Pneumatic Drills (See Drills)

Portable Conveyors
Burch Corp.
Iowa Mfg. Co.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Portable Engines (See Engines—Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

Power Cable (Rubber Clad)
American Steel and Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Pulverized Fuel Systems
Fuller Lehigh Co.
Gay Co., Rubert M.
Hardinge Co.
Raymond Bros. Impact Pulverizer Co.

Pulverizers (See also Crushers; Mills; etc.)
Bradley Pulverizer Co.
Fuller Lehigh Co.
Hardinge Co.
Lewistown Foundry & Machinery Co.
Raymond Bros. Impact Pulverizer Co.
Universal Crusher Co.
Williams Patent Crusher and Pulverizer Co.

Pumps (Cement-Slurry)
Morris Machine Works

Pumps (Centrifugal)
Allen Cone and Machy. Corp.
Fremont Foundry and Machine Co.
Georgia Iron Works
Morris Machine Works
Norbom Engineering Co.
Kansas City Hay Press Co.
Morris Machine Works
Norbom Engineering Co.

Purifiers, Steam (See Steam Purifiers)

Rails, Steel
Jones and Laughlin Warehouses

Ready-Mixed Concrete Plants
Stephens-Adamson Mfg. Co.

Rivets
Jones and Laughlin Warehouses

Rock Drills (See Drills—Rock)

Rod Mills
Hardinge Co.
Traylor Eng. & Mfg. Co.

Rope (Wire) (See Wire Rope)

Sand-Lime Brick Machinery
Hardinge Co.

Sand Separators
Allen Cone and Machy. Corp.
Link-Belt Co.
McLanahan and Stone Corp.
Smith Engineering Works
Stephens-Adamson Mfg. Co.

Sand-Settling Tanks
Allen Cone and Machy. Corp.
Iowa Mfg. Co.
Link-Belt Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.

Scrapers (Power Drag)
Iowa Mfg. Co.
Link-Belt Co.
Sauerman Bros.
Street Bros. Machine Works, Inc.

Screens
Allen Cone and Machy. Corp.
Chicago Perforating Co.
Deister Machine Co.
Diamond Iron Works
Eagle Iron Works
Ehrsam & Sons Mfg. Co., J. B.
Gay Co., Inc., Rubert M.
Hardinge Co.
Industrial Brownhoist Corp.
Iowa Mfg. Co.
Lewistown Foundry & Machinery Co.
Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Productive Equipment Corp.
Roebling's Sons Co., John A.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.
Universal Crusher Co.
Universal Road Machinery Co.

Screens (Vibrating or Shaking)
Allen Cone and Machy. Corp.
Deister Machine Co.
Diamond Iron Works
Gay Co., Inc. Rubert M.
Iowa Mfg. Co.
Lewistown Foundry & Machinery Co.
Link-Belt Co.
McLanahan and Stone Corp.
Productive Equipment Corp.
Stephens-Adamson Mfg. Co.
Williams Patent Crusher and Pulverizer Co.

Separators (Air) (See Air Separators)

Shafting (Steel)
Jones and Laughlin Warehouses

Sheaves
Eagle Iron Works
Link-Belt Co.
McLanahan and Stone Corp.

Sheets, Steel (Black and Galvanized)
Jones and Laughlin Warehouses

Shovels (Electric, Internal-Combustion, and Steam)
Bay City Shovels, Inc.
General Excavator Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Link-Belt Co.
Orton Crane and Shovel Co.

Silos
Burrell Eng. & Constr. Co.

Skip Hoists and Skips
Link-Belt Co.
Street Bros. Machine Works, Inc.
Stephens-Adamson Mfg. Co.

Speed Reduction Units
Iowa Mfg. Co.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Spouts (See Chutes and Chute Liners)

Sprockets and Chain
Iowa Mfg. Co.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Steel (Alloy)
Jones and Laughlin Warehouses

Steel (Structural Shapes)
Jones and Laughlin Warehouses

Steel Inclines (See Inclines, Steel)

Steel Grating (See Grating, Steel)

Steel Plate Construction
Jones and Laughlin Warehouses

Storage Equipment
Link-Belt Co.
Sauerman Bros.
Stephens-Adamson Mfg. Co.

Tanks (Sand-Settling)
Allen Cone and Machy. Corp.
Iowa Mfg. Co.
Link-Belt Co.
Morrow Mfg. Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.

Thickeners, Slurry
Hardinge Co.

Tools (Drill) (See Drilling Accessories)

Trailers
Bay City Shovels, Inc.

Tramways (Aerial)
American Steel and Wire Co.
Leschen and Sons Rope Co., A.
Roebling's Sons Co., John A.

Transmission Machinery
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Trippers
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Truck Cranes (See Cranes)

Tube Mills (See Mills—Ball, Tube, etc.)

Tube-Mill Liners (See Mill Liners and Linings)

Unloaders (Box-Car)
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Variable Speed Reducers or Transmissions
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Vibrating Screens (See Screens—Vibrating)

Washers (Sand, Gravel, and Stone)
Allen Cone and Machy. Corp.
Diamond Iron Works
Eagle Iron Works
Hardinge Co.
Iowa Mfg. Co.
Lewistown Foundry & Machinery Co.
Link-Belt Co.
McLanahan and Stone Corp.
Perfect Classifier Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.
Universal Road Machinery Co.

Weighing Equipment (Automatic)
Merrick Scale Mfg. Co.

Welding Supplies
American Steel and Wire Co.
Jones and Laughlin Warehouses
Roebling's Sons Co., John A

Well Drills (See Drills—Well)

Wheels (Car)
Eagle Iron Works
Iowa Mfg. Co.

Winches and Capstans
Link-Belt Co.
Stephens-Adamson Mfg. Co.
Street Bros. Machine Works, Inc.

Wire Cloth
Roebling's Sons Co., John A.

Wire Rope
American Steel and Wire Co.
Leschen and Sons Rope Co., A.
Roebling's Sons Co., John A.

Wire-Rope Fittings
American Steel and Wire Co.
Leschen and Sons Rope Co., A.
Roebling's Sons Co., John A.

Wire-Rope Slings
American Steel and Wire Co.
Leschen and Sons Rope Co., A.
Roebling's Sons Co., John A.

Wire (Welding)
American Steel and Wire Co.
Jones and Laughlin Warehouses
Roebling's Sons Co., John A.

Wire and Cable, Electric
American Steel and Wire Co.
Roebling's Sons Co., John A.

Worm Gears (See Gears and Pinions)

Industrial Equipment

Furnished Subject Trial in Your Service

For Sale — For Rent

OUR GUARANTEE

All equipment overhauled in our shops is guaranteed subject to thorough trial in service. Only part of the purchase price is required upon shipment, the remainder being payable after the purchaser has had an opportunity of testing the equipment in actual service. If the equipment does not prove entirely satisfactory and as represented by us in every respect we will either correct the defects, or the equipment can be returned to us at the end of the trial period and we will refund the purchase money paid, in full.

LOCOMOTIVES

1—Std. ga. 19x24 Porter 6-wheeled Switcher, Shop No. 6160, wt. 62½ tons on Drivers.
2—Std. ga. 17x24 Davenport 6-wheeled Switchers, Shop Nos. 1268 and 1563.
1—Std. ga. 14x20 Vulcan, 4-wheeled Saddle Tank, Code Boiler, Air Brakes, wt. 40 tons, Shop. No. 3272.
1—Std. ga. 14x22 American 4-wheeled Saddle Tank, wt. 37 tons, Shop No. 42768.
1—Std. ga. 14x20 Vulcan, 35 ton, Shop No. 1705.
3—Std. ga. 11x16 Davenport, wt. 21½ tons, A.S.-M.E. Nat'l Board Boiler, Shop Nos. 2056, 2149 and 2150.
2—36-in. ga. 10x16 Davenport, 4-wheeled Saddle Tank, Shop Nos. 1262 and 1263, wt. 19½ tons.
5—11x16 cylinder. 36-in. ga. Davenport, 4-wheeled Saddle Tank, Shop Nos. 2124-2125-2018-2152-2153, wt. 21½ tons, Nat. Board Boiler. 2018-2152-2153, wt. 21½ tons, Nat. Board Boiler.
2—11x16 Vulcan, 36-in. ga., Nos. 3297-3300, wt. 21½ tons.
1—9x14,—36" ga. Porter, 4 wheeled Saddle Tank, Code Boiler, wt. 15 Tons, Shop. No. 6958.

STEAM SHOVELS—Revolving

7—50-B Bucyrus, Shop Nos. 3951-3972-4003-4058-4577-4938-4987, steel cats., standard boom, A.S.M.E. boiler, 1¾-yd. Dipper.
1—Model 37 Marion, No. 4782, steel cats., standard equipment, 2-yd. Dipper, Code Boiler.
1—20-B Bucyrus, Shop No. 4137, ¾-yd. capacity Steel Caterpillars.
3—Type "B" Erie Full-Revolving Caterpillar Shovels, High Lift Boom, ¾-yd. Dipper, Nos. 1219, 2265 and 2703.

STEAM SHOVELS—Railroad

1—Model 80 Marion, No. 1312, 4-yd. Dipper.
1—60-C Bucyrus, No. 1388, 2½-yd. Dipper.

DRAG LINES—Steam

1—Model 37 Marion, Shop No. 4782, 50-ft. Boom, 1½-yd. Page Bucket, Code Boiler.
7—50-B Bucyrus, Shop Nos. 3951-3972-4003-4658-4577-4938 and 4987, Steel Cats., 50-ft. Boom, Fairlead, 1½-yd. Bucket.
1—Model 220 Page, No. 110, 72-ft. Boom, 2½-yd. Page Bucket, 100 HP. Charter Oil Engine, mounted on tandem trucks.
1—Class 14, Bucyrus, Shop No. 2140, 60-ft. Boom, 2-yd. Bucket, A.S.M.E. Boiler, Armored Caterpillars.

SHOVELS, CRANES AND DRAGLINES—Gasoline

8—No. 1 Koehrings as Shovel, Crane or Dragline, ⅜-yd capacity on caterpillars, Shop Nos. 268, 278-341-367-381-428-431-433.
1—Model 104 Northwest as Shovel, Crane, Dragline, 1-yd. capacity, on Caterpillars, Shop No. 1811.
2—Type K-2 Link-Belts as Shovel, Crane or Dragline, 1-yd. capacity, on Caterpillars, Shop Nos. 1052-1099-1124-1130.
2—Model 206 P. & H. Shovels, Cranes or Draglines, ¾-yd. capacity on Caterpillars, Shop Nos. 1764-2198-2299.
1—Model 210 P. & H. Dragline, 1-yd. capacity, Armored Caterpillars, Shop No. 1077, 40 or 50-ft. Boom.

SHOVEL PARTS

2—Complete Fronts No. 1 Koehring, ¾-yd.
3—Shovel Fronts, complete, for 104 and 105 Northwests.
3—Complete Shovel Attachments for K-2 Link-Belt, 1-yd. Dipper.
Parts for Type B Erie, 1—1-yd. Erie Dipper, Shovel Boom, Dipper Arm, and 1-yd. Dipper for No. 2 Koehring.

SIDE DUMP CARS

20—30-yd. Clark, Steel, Automatic.
24—30-yd. Western Automatic.
8—20-yd. Western Automatic.
14—20-yd Magor All-Steel Automatic Air.
72—16-yd. Western, Steel Sills, Wood Bed.
63—12-yd. Western.
2—8-yd. Std. ga. K. & J. Steel Beam, (Wood Bed).
3—6-yd. Std. ga. K. & J. Steel Sills, Truss-rod Doors.
14—8-yd. 36-in. ga. Continental Double Trucks Steel Sill, Wood Beds.
3—5-yd. 36-in. ga. Continental Wood Bed, Steel Sills.
20—5-yd. 36-in. ga. Koppel, Steel Sills.
8—5-yd. 36-in. ga. Western Steel Beam.
37—4-yd. 36-in. ga. Western Steel Beam.
4—4-yd. 36-in. ga. Western Wood Beam.

LOCOMOTIVE CRANES

1—Dock Crane, Bucket operating, 50-ft. Boom, 7-ft. 10½-in. ga., 12-ft. wheelbase, capacity 15 tons at 18-ft. radius.
1—23-ton McMyler, 8-wheeled, MCB Trucks, Shop No. 3376.
1—40-ton Type J, McMyler Locomotive Crane with 50, 70 or 86-ft. Boom, Shop No. 3514, N.B. Boiler.
1—30-ton McMyler Type J, Shop No. 3057, with 50, 70 or 90-ft. Boom and Outriggers.
1—20-ton Brown Hoist, Shop No. 8054, 50-ft. Boom.
2—30-ton Ohio Locomotive Cranes, 60-ft. Booms, new 1929, Nos. 3952-3953.

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8—Std. ga. Jordan All Steel, Air Operated.
1—36-in. ga. Western.
1—36-in. ga. Nordberg, Shop. No. 513.

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4—5-yd. Euclid Caterpillar Dump Wagons.
17—1½-yd. Western, Streich & Stroud Dump Wagons.
1—27-E Foote Paver, Caterpillars and Miscel. Road Equipment.
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2—Chicago Automatic Portable Conveyors. 45-ft. model HBW. Without motors and with or without belting.
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2—No. 5 Weller stone and ore elevators. 50-ft. centers.
1—20-ton Koehring gas crane on caterpillars. 45-ft. Boom.
2—No. 4 Austin Gyratory Crushers.
3—25 H.P. Double drum hoists.
1—3½-yd. Bucyrus Steam Shovel dipper.
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1—Minneapolis Hoist Ford Dump Truck—Dual wheels, 1930 Model, 1 yd.
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34—4-yd. Heavy steel stone skips.
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56—Koppel 5-yd., 36-in. Gauge, 2-way Dump.
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15—Portable gasoline driven, cap. 92, 118, 160, 210, 310 cu. ft. Ingersoll-Rand, Sullivan, Chicago Pneumatic and Domestic.
4—Belt driven with A.C. motors. 1—Ingersoll-Rand duplex, cap. 1198 ft., 30 lbs. pressure. 1—Sullivan WJ-3, 625 cu. ft., 1—Ingersoll-Rand, type XCB-2, 2-stage, 510 cu. ft. 1—Ingersoll-Rand ER1, 320 cu. ft. single stage.

CRANES [Locomotive]

8—Gasoline Cranes on Crawlers. Cap., 12 ton to 7 ton. Booms length from 50 to 30 ft. Following makes Austin-Wolverine and No. 5. Brown Hoist No. 2, No. 1 and CC. Link Belt K-1. Northwest 104.
2—Steam Cranes on Crawlers, 1—Erie B.2 and 1—Byers Model 10.
3—Locomotive cranes; 1—30-ton Ohio; 1—25-ton Ohio; 1—25-ton Browning.

CONVEYORS and ELEVATORS

7—Portable Belt Conveyors with steel frames, with gasoline or electric power. 2—Barber-Greene, one 24-in. belt 70-ft. centers. One 18-in. belt, 60-ft. centers. 2—Barber-Greene 18-in. belt, 42-ft. centers, portable. One Northern 24-in. belt, 36-in. centers. One Jeffrey 16-in. belt, 30-ft. centers.
5—Bucket elevators, 42 to 82 ft. centers, 3 with buckets on chain.

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1—Thomas 100 HP 2-speed special slackline hoist; line pull high speed 4,500 lbs. at 600 ft. P. M. low speed front drum line pull 14,000 lbs. at 200 F.P.M., 14,000 lbs. at 200 F.P.M. on rear drum; complete with motor and control for alternating current.
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We have inspected and can offer over 100 crushers of different makes; cone, gyratory, jaw and pulverizers.

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1—American steel stiff leg, 100 ft. boom, 20 ft. bullwheel, 20-ton cap. at 100 ft.
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Several steel and wood stiff leg derricks with 50, 60, 70, 80 ft. booms, cap. 5 to 10 tons.

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14 miles of 36-in. ga. 25 lb. portable track, 15-ft. sections, 7 ties per section, located in Florida.
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25—Denver Waughammers, Model 37, DF rotation, with chuck for 1" steel; weight 69 lbs. each; capacity to 12 ft. deep.
3—Denver, Model 21, 1¼" chuck; capacity 3" hole 20 ft.; 2½" hole 30 ft.; for derrick mounting with derrick; weight without derrick 168 lbs.
4—Denver, Model 17, 1¼" chuck with No. 780 guide shell mounting and column; weight bare drill 120 lbs.; capacity same as above.

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1—Fairbanks-Morse 100 HP Diesel type Y 2 cylinder.

HOISTS

178—Hoists as follows: 55 Electric, sizes from 125 to 20 HP. 38 Gasoline 120 HP to 8 HP. 85 Steam Sizes 10x12 to 6¾x6. Single, Double and Triple Drum.

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24—Gasoline Locomotives as follows: 4—Plymouth 14-ton, 36-in. gauge; 3—Plymouth 8-ton, 36-in. gauge; 7—Whitcomb 8-ton, 36-in. gauge; gear drive; 1—Whitcomb 7-ton, 36-in. gauge; 1—Plymouth 7-ton, 24-in. gauge Friction Drive; 1—Plymouth 7-ton, 24-in. gauge gear drive; 1—Milwaukee 7-ton, 24-in. gauge; 2—Plymouth 4-ton 24-in. gauge, Friction Drive; 2—Brookville Fordson 2-ton stan. gauge; 1—Brookville Fordson 2-ton 36-in. gauge.

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33-ton 13x18" Vulcan 4-wheel saddle tank, 180 lbs. steam.
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25-ton Browning 8-wheel, 50' boom.
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2—50-B Bucyrus-Erie Steam Shovels
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1—10-ton Steel Stiff Leg Derrick, 75-ft. boom
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2—8-ton 36-in. ga. Whitcomb Gas Locomotives
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40-in. Revolving Screen, 18-ft.
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40 H. P. Westinghouse Motor, AC3-60-220.
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150 HP Sauerman Diesel, 4 yd. Crescent bucket.
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Batch box cars and gasoline locomotives of all gauges on hand.
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BOILERS	DRILLS	PIPE
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CARS	EXCAVATORS	RAIL
COMPRESSORS	ELEVATORS	SCALES
CONVEYORS	HOISTS	SLACKLINES
CHANNELERS	GENERATORS	SHOVELS
CRANES	KILNS	TRACTORS
CRUSHERS	LOADERS	TRUCKS
DRYERS	LOCOMOTIVES	ETC.

I Can Sell Your Surplus Equipment

ALEXANDER T. McLEOD
First National Bank Bldg. CHICAGO, ILL.

Shovels or Cranes
FOR SALE

1—Factory rebuilt Lima 1¼ cu.yd. capacity. This machine can be equipped with either shovel, clamshell, dragline or drag shovel attachments. Very reasonably priced. Carries new machine guarantee. Located at Newark, N. J.

1—GA-2 Erie Gas Air Shovel. Fine condition and bargain. Located Newark, N. J.

General ½ yd. combination shovel, backhoe, 2 buckets, and crane boom. Very good condition. Located Long Island.

1—Type B Erie Shovel or Clamshell machine, good condition. Located Newark, N. J.

Complete shovel attachment for Type "O" Thew. Also, attachments for Type B and B-2 Eries, located in New Jersey. Decided bargains.

1—P & H 1¼ yd. gas shovel. Excellent condition, very attractive price. Located Newark, N. J.

1—Linn Tractor, 6-yd. capacity, with Waukesha Motor. Machine in very good condition. Priced to sell quickly. Located New York State.

We have both Steam and Gasoline Excavators ranging from ½ to 1½ cu.yd. capacity in various parts of the country that will be sold at extremely low prices or leased with leased payments made applying on purchase price.

LIMA EXCAVATOR SALES AGENCY

Lima, O., Office:	*Eastern Offices and Warehouse:*
Lima Trust Bldg.	317 Frelinghuysen Ave., Newark, N. J.
Tel. Main 4824	Tel. Waverly 2-0640

Wire or phone nearest office at our expense.

MOTOR BARGAINS
3 PHASE, 60 CYCLE

HP	Make	Volts	Type	Speed
1-600	G. E.	440/220	Synch.	360
1-500	Al-Ch	2200/550	Slip ring	505
1-300	Wsthse	440/220	Synch.	600
1-200	Wsthse	440/220	Slip ring	500
1-130	G. E.	220/440	Synch.	1200
1-110	G. E.	2300	Synch.	1200
1-200	F. M.	440/220	Slip ring	600
10-100	Wsthse	550	Sq. Cage	700
2-100	Wsthse	440/220	Sq. Cage	720
1-100	Cr. Wh.	220/440	Synch.	225
1-75	G. E.	2200/440	Slip ring	695

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Belyea Co., Inc. 153 W. 18th St. New York City
REBUILT—GUARANTEED

FOR SALE

1—Mundy 125 H.P. 2 drum hoist direct connected to 125 H.P. Westinghouse type C-1-Motor 440 volts, 680 R.P.M.

1—100 foot Page Mast with all necessary guy lines.

1—2″ slackline cable—1300 feet.

1—1½ yard Sauerman bucket.

Above equipment used 1½ seasons. Price $5,000.00 F.O.B. Cars, Richmondale, Ohio.

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Motors and Generators, A. C. and D. C. for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

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⅞ in. dia. 6x19 Plow Steel, 1150′, 4000′, 4500′, 1000′, 820′, 214′, 250′, 228′.
1 in. dia. 6x19, Plow Steel, 4 reels 1250′ each reel; one reel each, 5100, 3500, 1300, 960, 1459.
Also ⅝ in. dia., ⅞ in. dia., ¾ in. dia., 1¾ in. dia., 1⅞ in. dia., 2 in. dia. and 2¼ in. dia. Suitable for Guys, Hoisting and Draglines.
Send for complete list. Priced right for immediate sale.
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FOR SALE

1—No. 8 Austin Gyratory crusher.
1—No. 6 Austin Gyratory crusher.
1—No. 4 Austin Gyratory crusher.
1—18 by 36 Farrel Jaw crusher.
1—18 by 36 Traylor jaw crusher.
1—14 by 26 Acme jaw crusher.
1—30 by 42 Buchanan crusher.
1—24 by 36 Farrel jaw crusher.
1—20-in. vertical elevator.
2—48-in. Farrel screens.
1—60-in. by 16-ft. screen.
1—54-ft. centers 30-in. bucket belt elevator.
1—28-ft. centers 30-in. bucket belt elevator.
1—Single drum hoist direct connected to 15 H. P. LeRoi engine with 500-ft. cable.

Blue Ball Machine Works
Blue Ball, Pa.

CARS & LOCOMOTIVES

2—12-Ton Plymouth, 36″ ga. Gas.
1—8-Ton Plymouth, 36″ ga. Gas.
1—8-Ton Whitcomb, 36″ ga. Gas.
30—4-yd. & 5-yd. 36″ gauge Dump Cars.
1—Nordberg Track Shifter, 36″ ga.

DRAGLINES & PUMPS

1—4-yd. Monighan 110′ Boom Diesel.
1—2-yd. Monighan 70′ Boom Diesel.
8—2″ to 12″ Pumps.
3—10-Ton Tractors.
Dragline Buckets, ¾ yd. to 5 yd.
Gas & Steam Hoists, 75 to 100 HP.

R. J. BLACKBURN, Inc.
St. Louis, Mo.

SWEDISH HOLLOW DRILL STEEL
GUARANTEED 100% PERFECT

Considerably below market prices.
20 ton ⅞-in. Hexagon.
50 ton ⅞-in., 1-in., 1⅛-in., 1¼-in., and 1⅜-in. Round, Hexagon and Quarter Octagon.

MARINE METAL & SUPPLY CO.
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AIR COMPRESSORS

Ingersol-Rand 14x12 ERi Air Compressor, 464 Ft. capacity, with idler, bolt tank, 75 hp. Westinghouse A.C. Slip Ring motor with drum control. $1150.

Chicago Pneumatic 10x12x10 N-SS steam driven air compressor 350 Ft. capacity with tank. $450.00.

Write:—G. A. UNVERZAGT
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PIPE
FOR EVERY
PURPOSE

JOS. GREENSPON'S SONS
IRON AND STEEL COMPANY
ST. LOUIS, MO. - TULSA, OKLA - NEW YORK CITY

FOR SALE

Crushers—42-in. Kennedy, 42-in. McCully, No. 26 Traylor. Two No. 7½ K Gates, two No. 4 Austin. 24x36—30x42—40x42 Jaw 36x54 single roll Jeffrey.
Loco. Crane, 25 ton Browning, $3,750.

A. V. KONSBERG
111 W. Jackson Blvd. Chicago, Ill.

FOR SALE

78C BUCYRUS STEAM SHOVEL
Rebuilt; Excellent Shape.

FRAZIER-DAVIS CONSTRUCTION CO.
Arcade Bldg., St. Louis, Mo.

WE LOOK INTO THE EARTH

By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

WANTED—LIME BURNER

A new company Pacific Coast Lime manufacturer, operating about four months, wants a first class experienced lime burner to take charge of kiln and quarry. Must know lime manufacturing business thoroughly. Will furnish residence and supplies and give stock in company for wages until production and products on satisfactory basis. Address Box 606, Pit and Quarry, 538 S. Clark St., Chicago, Ill.

WAUKESHA MOTORS

60, 80, 100, and 120 h.p. Like new, guaranteed—at less than 1/3 original cost. Also have several Universal, Buda, Hercules, Climax, LeRoi, and Continentals from 4 h.p. up. 1, 2, 4 and 6 cylinders, guaranteed A-1 condition. Cheap.

MERTES MACHINERY CO.
1622 So. First St. Milwaukee, Wisc.

FOR SALE

COMPRESSOR

Gardner Duplex Vertical XH Type, direct connected to 50 hp. A.C. motor, 265 cu.ft., 125 lbs. Used only two months, complete with all fittings, suction valve unloader and air receiver.

F. H. LENGFELT & CO.
350-356 Woodward St., Jersey City, N. J.

MISCELLANEOUS BARGAINS

Asphalt Plant—1800 yd. rebuilt and like new.
Electric Dragline—1½-yd. on cats. $4750.
Shovel Attachments—For P&H 206 & NW 105 & 104.
P&H 206 Shovel, Crane & Drag. (3) $2750 & up.
NW 105 Shovel, Crane & Drag. (4) $2750 & up.
Gas Hoist—60 HP, 3 drum, with swinger if desired.
Diesel Engines—65-75-100 & 120 HP. Real bargs.
Car Puller—5 HP electric, capstan type. $225.
Boiler—54x96 Vertical ASME 125 lbs. $325.
JAMES WOOD, 53 West Jackson Blvd., Chicago, Ill.

OVERLOOK MACHINERY SALES

offers a complete line of used, rebuilt, reconditioned shovels and cranes at bargain prices. Ask for details on make and size you prefer.

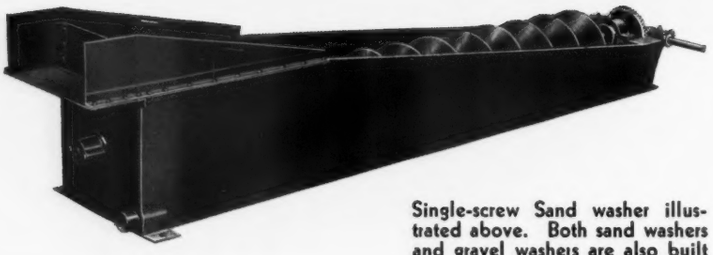
OVERLOOK MACHINERY SALES
2502-6 East Erie Ave., Lorain, Ohio

LOCOMOTIVE CRANES

2—No. 6 Brownhoist 40-ton 8-wheel cranes with 60 ft. booms.
1—25-ton 8-wheel Ohio Crane with 60 ft. boom.

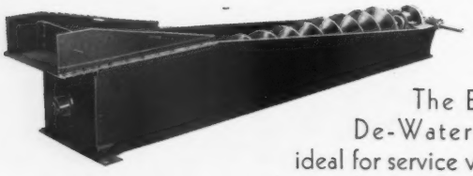
The W. T. Walsh Equipment Co.
12500 Berea Rd. Cleveland, Ohio

Sand Washing → OR De-Watering



Single-screw Sand washer illustrated above. Both sand washers and gravel washers are also built in twin-screw models for greater capacity.

Whatever your problem, there is an Eagle that will solve it, at an increased efficiency and reduced operating cost.



The Eagle De-Waterer is ideal for service where sand must be delivered or stored dry. Identical with the Eagle Washer, except that bottom wash water pipe is eliminated. In actual operation, has reduced moisture to less than 6% in the bin. Ask for full details.

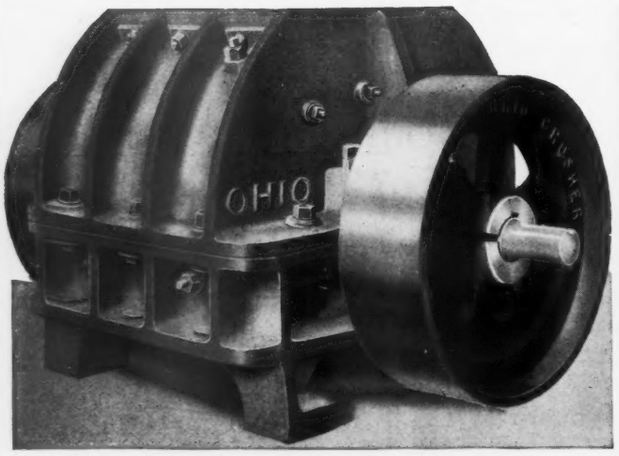
Experience has proven that sand requires a different washer than gravel. Hence the Eagle Sand Washer, similar to the Eagle Gravel Washer, but longer, to give complete de-watering of fine materials, and with higher side plates, which gives a deep settling basin.

If the problem of washing **sand** is troubling you, consult us. We will conduct a thorough investigation, and if, in our opinion, an Eagle will solve your problems, we will recommend a machine and guarantee performance. Fair enough, isn't it? Write us today!

See P&Q **HAND BOOK** *Pages 68, 600*

EAGLE IRON WORKS

129 Holcomb Ave. **Des Moines, Iowa**



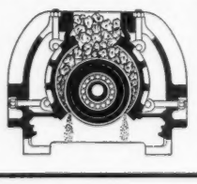
High Capacity, with a Quality Product

Unusually high capacity is the direct result of the sound reasoning, engineering knowledge and practical experience, that have been built into the Ohio Crusher. The fact that the Ohio crushes on both sides of an oscillating cylinder, against two curved crushing plates, explains its high capacity. The product of the Ohio is of a remarkably high quality, due to the true compression action in crushing, which minimizes the production of "fines"; to the curved surfaces of the cylinder and crusher plates, both of which are corrugated, thereby breaking up "slabs" and to the short, rapid, parallel stroke of the eccentric shaft.

One of the most important and exclusive features of the Ohio Crusher is this: The cylinder does not revolve, but has a creeping action that insures uniform distribution of wear over its entire circumference.

The OHIO Crusher

May we send you complete information?



James H. Beans Foundry Company

Martins Ferry, Ohio

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The "Wunder" Plant *of Minneapolis*

"Economize by Modernizing." That is the way to strengthen your competitive position, cut production costs and pave the way to adequate profits.

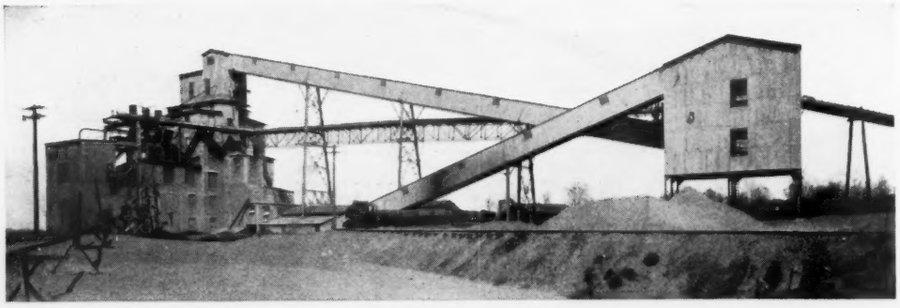
In 1914 the John Wunder Company, a subsidiary of Landers-Morrison-Christensen Company (Minneapolis), erected a Link-Belt designed and equipped plant. The original Link-Belt inclined conical screens (illustrated), were installed at that time, and are still in daily service.

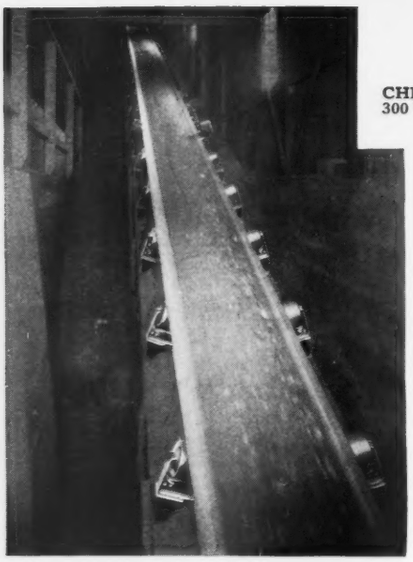
Last year, the steel and concrete structure shown here was erected, and these original Link-Belt screens were augmented with many units of modern design.

Link-Belt equipment in use here consists of belt conveyors, speed reducers, chain drives, inclined conical screens, Shaw classifiers, etc.

Place with Link-Belt engineers the responsibility for a successful plant that will turn out a clean, correctly sized product at lowest cost per ton.

These Link-Belt Conical Screens in Service *since* 1914





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Leading Manufacturers of Equipment for
Handling Materials Mechanically and for the Positive Transmission of Power

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H. W. Caldwell & Son Co.:—Chicago, New York, Dallas
Offices in Principal Cities

LINK-BELT

Sand, Gravel, Stone Washing and Handling Equipment

Abundant PROOFS

Think of it . . .

15 to 50 years of continuous quarry service and still going strong! Sounds almost unbelievable, yet we have on file many of the nation's foremost quarry operators, who can verify the exceptionally long life of PORTERS now in their service.

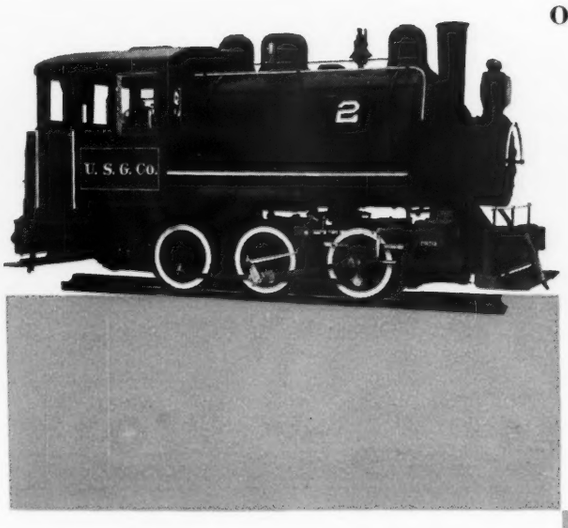
This unusual longevity in PORTERS is the heritage of 65 years experience in building fine locomotives.

That is why you can almost forget depreciation costs when you put PORTER on the job.

H. K. PORTER COMPANY
Pittsburgh, Penna.
Established 1865

New York Office: 44 Whitehall Street
Chicago Office: Engineering Bldg., Wells Street & Wacker Drive

Builders of Steam, Fireless Steam, Gasoline-Electric—Oil-Electric, Gasoline and Compressed Air Locomotives



PORTER
"better built"
locomotives

PORTER
LOCOMOTIVES

You Can Steer This P & H To Dig Where You Need To Dig . .

Many a shovel operator will run up costs by continuing to work at a poor front simply because it takes too long to maneuver his shovel to another place.

Now P & H overcomes this by giving its large shovels the same mobility that you have known before only in small machines. You can steer the P & H 2½ or 3½ yard machine accurately, easily, and entirely from the operator's seat, without the necessity of blocking one crawler to make a turn. You can travel at a speed of better than a half mile an hour. P & H's husky Diesel engine makes it unnecessary to drag an awkward cable. And the P & H has ample reserve power to pull out of holes and travel over obstacles that would stop many a shovel.

Use P & H for economy and fast operation. (Single motor electric power available where desired.)

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Established in 1884
4451 West National Avenue, Milwaukee, Wisconsin
Offices and Agents in All Principal Cities
Warehouses and Service Stations: Hoboken Memphis Jacksonville Seattle Los Angeles San Francisco Dallas

P&H

27 STANDARD MODELS $6,500 TO $65,000
SHOVELS • • DRAGLINES • • CRANES • •
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FULL REVOLVING MODELS ⅜ TO 3½ CU. YDS. CAP'TY